International Abstracts of Surgery

Surgery, Gynecology & Obstetrics

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JUNE 1955

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International Abstracts of Surgery

JUNE 1955

VOLUME 100
NUMBER 6

Collective Reviews

PROGRESS IN GYNECOLOGY

JOE VINCENT MEIGS, M.D., F.A.C.S., F.R.C.S.E. (Hon.), and F.R.C.O.G. (Hon.),
Boston, Massachusetts

THIS PAPER is an endeavour to cover the progress in gynecology and is deliberately not concerned with obstetrics. A review of obstetrics should be written by an obstetrician.

The changes which have taken place in gynecology in the 50 years since the first issue of SURGERY, GYNECOLOGY AND OBSTETRICS was published in 1905 would indeed startle the men who contributed to the first issue of the new journal. A perusal of the first volume shows that the problems which concerned the gynecologist of that day were related to the treatment of appendicitis, especially in pregnancy, the type of suspension to use, the treatment of pelvic infections, the method of choice of vaginal plastic operations, and whether lymph node dissections were indicated in the radical surgical attack on cancer of the cervix. Perusal of the subsequent volumes of SURGERY, GYNECOLOGY, AND OBSTETRICS reveals that the field of gynecology has grown enormously. To the specialty have been added the fields of radiation therapy, endocrinology, and even psychosomatic medicine. The armamentarium of the gynecologist has been vastly improved by these additions. In a discussion of the progress of the specialty of gynecology we will begin with the problems of treatment of diseases that at this present writing are solved or nearly solved.

In the first issue 50 years ago one of the most discussed subjects was the best method of suspension of the uterus. Now suspensions of the uterus are done infrequently and only for clear-cut indications which are generally accepted. These indications are: (1) patients with pelvic pain who secure relief when retroversion is corrected with a pessary; (2) the rare sterile patient who, after prolonged study which showed all other tests to be normal, has her retroverted uterus suspended in a final effort to help her achieve a pregnancy; and (3) the suspension that accompanies a plastic operation on the tubes, or resection of ovarian cysts which is done to keep the uterus from becoming adherent in the posterior cul-de-sac.

We have reviewed the gynecological operations performed at the Massachusetts General Hospital during this half century, and although the total number of gynecological procedures increased only from 453 in 1901 to 565 in 1953, the type of surgery has markedly changed (Table I). The operation of suspension of the uterus was done 77 times in 1901; 73 times in 1921; 60 times in 1922; 73 times in 1932; then gradually was abandoned so that in 1942 only 4 operations were done, and in 1953 only 1 suspension was done on the Ward Service. Whether this is progress or just change, only time will tell.

TABLE I.—NUMBER OF OPERATIONS PERFORMED IN YEARS LISTED AT THE MASSACHUSETTS GENERAL HOSPITAL

	1901	*1912*	*1922*	*1932*	*1942*	*1953*
Total number	453	484	448	607	536	565
Suspension of uterus	77	73	60	73	4	1
Vaginal drainage of pelvic abscess	6	13	12	1	0	0
Operation on tubes or tubes and other minor gynecological operations	86	87	58	77	19	21
Myomectomy	3	5	0	2	4	0
Operation on ovary	9	13	17	18	6	8
Presacral neurectomy	0	0	0	1	6	4
Exploratory laparotomy	4	14	14	22	6	18
Vaginal plastic operation	61	72	68	36	50	14
Vaginal hysterectomy	4	0	3	9	18	37
Supravaginal hysterectomy	44	65	68	105	8	2
Total hysterectomy	11	6	10	37	121	99
Radical surgery:						
Wertheim	0	4	1	0	0	0
Meigs operation	0	0	0	0	7	11
Exenteration	0	0	0	0	0	6
Vulvectomy and groin	0	0	0	6	8	3
Miscellaneous	148	132	137	220	279	341

The treatment of patients with pelvic inflammatory disease both gonorrheal and postpuerperal has been markedly changed during the past 50 years. The older methods of position, rest, and sedation have been greatly aided by the addition of the understanding of fluid balance and of new chemotherapeutic and antibiotic agents which have so dramatically altered the care of all surgical infections. The problem of gonorrhea is not a large one and the condition is rarely seen in the private office of the gynecologist. The large public clinics still have the problem and some of the postpuerperal infections are still resistant to modern chemotherapeutic and antibiotic agents. Sulfa and penicillin resistant strains of bacteria may in the future again make pelvic inflammatory disease a serious problem for the gynecologist, but at the present time pelvic cellulitis can usually be successfully combated by modern therapy.

A glance at Table I will illustrate that vaginal drainage of pelvic abscesses used to be fairly frequent but is now unusual. The treatment of tuberculosis of the pelvic organs remains unchanged, except that the use of streptomycin and isonicotinic acid hydrazide is being given a satisfactory trial. Large series of cases have not yet been reported to determine whether or not surgical extirpation of the uterus, tubes, and ovaries should give way completely to antibiotics. Fortunately in this country the marked decline in the incidence of tuberculosis has lessened this problem. However, in the British Isles and on the Continent genital tuberculosis seems to be a real problem. The endometrial biopsy has definitely increased the number of cases discovered.

The treatment and management of fibroid tumors have apparently been solved, except that methods of preventing their occurrence should be among the investigative problems of our researchers. It is obvious that fewer radical operations are being carried out, that myomectomy is popular, and that the natural menopause is more often being awaited to effect a cure. Certainly the treatment of these tumors offers a problem no longer. The treatment of other benign tumors offers no special problem and seems agreed upon. The old and tried method of radium or roentgen ray treatment of fibroids and abnormal uterine bleeding has been nearly forgotten and probably rightly so. This treatment may be satisfactory, but on numerous occasions the bleeding continued and the fibroid did not shrink. In certain other instances cancer of the endometrium developed. Randall (24) and Corscaden (2) have emphasized that the patient with a too long, heavy, and delayed menopause may develop endometrial cancer in an increased proportion.

The care of childbirth lacerations, cystocele, rectocele, and prolapse has gradually changed during this half century. The old methods of repair of the cervix, repair of the cystocele and of the perineum, and supravaginal hysterectomy or suspension have given way to either the Fothergill-Manchester-Donald operation or vaginal hysterectomy, or to the method—if the cystocele is not too large—of total abdominal hysterectomy and repair of the perineum. Another glance at Table I will illustrate the change in gynecological surgery at our hospital, vaginal plastic operations gradually being replaced by vaginal hysterectomy plus repair. Supravaginal hysterectomy has been abandoned; the cervix is almost always removed. It is obvious that the surgical treatment of benign lesions and reconstructive problems have been satisfactorily settled.

The repair of vesicovaginal fistula has been solved and the basic methods date even before the first volume of SURGERY, GYNECOLOGY, AND OBSTETRICS. Vesicovaginal fistulas due to obstetrical difficulties are not common at this time but fistulas due to injury of the bladder during total hysterectomy, radical hysterectomy and node dissection for cancer, and radiation are ever

present. Modifications in treatment have been made but the fundamental method of exposure of the bladder and its proper approximation and of exposure of the vagina as a separate layer is a basic necessity. The repair of radiation fistulas, new lesions to the gynecologist of 50 years ago, is fundamentally the same as that of fistulas due to injury at childbirth. The repairs of such fistulas are among the well understood problems, but the prevention of them is more important than methods of repair. Advances are being made in the repair of huge fistulas that have been caused by radiation, and transplantation of attached muscles with conservation of their nerve and blood supply, the use of omentum, and even of bladder peritoneum and freed bowel are suggested (13, 33).

There remain a great many problems that are definitely unsolved, and some of these are listed and some of them discussed.

Certainly the proper treatment of local vaginal infections, such as those due to the trichomonas and monilia, is far from satisfactory. The mere knowledge that there are at least 30 methods of treatment of the trichomonas infestation demonstrates our inability to handle this disagreeable condition properly. The same may be said of monilia, although not to quite such a degree.

The management of sterility problems is a new development in this last half century. Tests for the determination of the time of ovulation, the state of the endometrium, and the patency of the fallopian tubes are becoming more and more standardized. The use of the Rubin test, hysterosalpingography, and culdoscopy are important in determining the patency and normal activity of the tube. Surgical procedures, such as reimplantation of the tube into the cornua of the uterus and various methods of opening the adherent fimbriated end of the tube, are somewhat satisfactory. Newer methods, such as the use of polyethylene or other nonirritating material, to keep the repaired organ open (11, 27) are gaining slightly in the solution of the problem. The knowledge of male fertility is of the greatest importance in this study and the ability to evaluate the male's fertility is fairly well understood, but methods of increasing the potency of his sperm are not really available. The problem of how to induce ovulation is far from settled and no real method has been advanced for the human being, although a method has been found for animals. If ovulation can be induced in the human female, many of the problems of infertility and abnormal menstrual cycles may be solved. The advances in the sterility field are great, but the production of ovulation and satisfactory sperm are among the important unsolved problems. Artificial insemination is used with more and more frequency and certainly most families are perfectly satisfied with this method of overcoming the husband's infertility. The legal aspects of the responsibility of the parents is not perfectly clear at the present time, but certainly this difficulty cannot be allowed to check this desirable method of solving our sterility problem for some females. Concentration of the husband's semen has not been so successful as it was hoped it would be, nor is insemination with the husband's own semen. Sterility investigations are standardized and real success has followed.

The cure of stress incontinence of urine occupied the gynecologist of 50 years ago as it does the modern gynecologic surgeon. The mere fact that there are so many different methods of attacking the problem is proof that no completely satisfactory method is available. This distressing condition cannot be relieved in 100 per cent of the cases and many patients are subjected to many procedures before any or no relief is found. The renewal of the old method of exercise of the voluntary muscles of micturition has been found of significant help along with surgical procedures (17) (before or after). From the simple reinforcement of the tissues under the urethra in an attempt to push up the floor of the urethra to the use of fascial slings under the urethra placed in position from behind the symphysis pubis, and to attempts to attach the vagina from above to the back of the symphysis and to the rectus fascia, the repair operations have run the gamut of the imagination. Some patients are cured—many are "cured"—but there are some who are not. More study must be done on the physiology of micturition and greater knowledge must be obtained as to the why and wherefores of this condition. Certainly the advances have been great but the problem is definitely an unsolved one. The knowledge of the bladder and its nerve supply, although discussed and written about for years, remains nebulous. Its importance is very great, especially since the renaissance of radical pelvic surgery for cancer of the cervix. The blood and nerve supply of the ureter, bladder, and rectum, so many times injured during radical surgery, needs to be further investigated and the anatomy further demonstrated. The work of Jeffcoate (16) in establishing the fact that the

angle of the bladder and urethra is important has helped. The aim of the gynecologist is to produce by his surgery the 90 degree angle between the posterior part of the bladder and the posterior urethra. If the angle can be produced, then incontinence is usually relieved.

Unsolved problems in endocrinology and in radiation therapy will be taken up under those headings. The diagnosis and treatment of malignant diseases of the female pelvic organs is being left for later discussion, as their treatment is perhaps our most important and greatest difficulty.

Endocrinology. The problems of the endometrium, the understanding of the physiology of the ovary, and the action of the glands of internal secretion on the end organs are completely new since the July, 1905 issue of SURGERY, GYNECOLOGY, AND OBSTETRICS. That there were ova was understood and that there were cyclic variations in the endometrium was understood, but exactly what the hormones were, how they were stimulated to work, and what they did was not known. As time went on in the half century that we are discussing many of the facts were clarified and the actual methods and the specific actions of various hormones were demonstrated. The importance of the pituitary gland and its relation to the other organs of internal secretion was discovered, the sequence of FSH, estrin, ovulation, luteinizing and luteotrophic hormones, and corpus luteum formation was determined and the effect of these hormones upon the endometrium was systematized. Thus as soon as theelin, or estrin, and the corpus luteum hormone, or progestin, were found and could be extracted or manufactured for use the treatment of obvious endocrine conditions commenced. A substitute for estrin, called stilbestrol, with a different chemical make-up was synthesized and has been found to be potent. The greater occurrence of nausea following its use has limited its effectiveness. The knowledge of the pituitary hormones and pituitarylike hormones from the placenta further stimulated research and later clinical use in glandular deficiencies. The hopes were great and many were realized. We now have tests for the presence or absence of the ovarian hormone, estrin, and for the presence or absence of follicle-stimulating hormone, or the pituitary-luteinizing hormone. Pregnandiol determinations give an estimate of corpus luteum activity. It has become easy to determine the presence of the menopause and to treat it, and quite possible to treat patients with abnormal bleeding, whereas formerly radiation or surgery was the only method of therapy. The amenorrheas were divided into primary and secondary types, and certain good results were obtained by intelligent treatment of these conditions. The importance of the thyroid and the adrenal glands was recognized. Following this, much more intelligent interpretations were made concerning precocious puberty, acromegaly, ovarian dwarfism, and the other manifestations and aberrations of the glands of internal secretion.

In the management of the pseudohermaphrodite distinct advances have been made. Determination of sex can now be accomplished by biopsy of the skin (22) and study of the character of the chromosomes. Psychiatrists (14), in studying these patients, can decide whether or not the patient is a male or female by his or her feeling and manners, in spite of his or her gonads. More intelligent therapy and reconstructive surgery can be entertained; even though the organs are male does not mean that a girl should be suddenly transformed into a boy. This is a most important consideration in the evaluation and treatment of these unfortunate patients.

Knowledge of the endocrines is far from complete and further research to determine the presence in, and the extraction of, the pituitary and other hormones in the blood rather than in the urine will further help us in our clinical approach to endocrine conditions. The physiology of the female is much better understood and we of this modern era are equipped with real, and not inert, hormones such as ovarian extract, corpus luteum extract, and even ovarian residue.

The polycystic ovary syndrome associated with amenorrhea, hirsutism, and sterility, as discussed by Stein and Leventhal (31), is new. These markedly enlarged ovaries show a thickened tunica albuginea which may prevent ovulation. The enlargement is due to multiple small cysts in all stages of development and atresia. Some show marked luteinization of the theca about the unruptured follicle. Strangely enough, in many cases the excision of a wedge from these ovaries permits a return to normal menstrual cycles and to ovulation and pregnancy. This lesion was unknown to our gynecologists in 1905. Some endocrine difficulty must be present, but the exact hormonal or other mechanism is not known.

The problem of the retention of the ovary in surgical operations is up again for general consideration. In 1920 when endocrinology was in

its beginning, the practice of castration at the time of hysterectomy was discussed and settled in favor of leaving in the ovaries. Castration is now being advised by some (9) because it is now possible to treat acute ovarian failure by means of hormones. However, the problem is one of psychiatric import also, for the husband of a castrate cannot help but feel superior to his mate and to blame many shortcomings in his wife to her castrated state. The wife cannot but feel inferior to her strong mate with his full gonadal complement. This mental effect on the two partners' superiority and inferiority, plus the atrophying effect of castration on the vagina and the occasional shortening of the vagina by surgery, places the wife at a distinct disadvantage. The changes in her hair, skin, and the onset of osteoporosis later makes the effect of castration too great a price to pay for protection against the possible malignant changes in the remaining gonads. Castration does prevent the occurrence of ovarian cancer but the price is too great to pay.

The problem of dysmenorrhea has remained unsolved. The use of presacral or superior hypogastric nerve excision still can be considered of value in certain cases. The inconsiderate use of this operation should be condemned. Dilatation and hormones have not been proved of real value. Oxygenation may be of real service, but is difficult to use and is mainly of research value (3).

The value of endocrinology to the gynecologist is great. It is obvious, however, to any student of this modality of medicine that if the gynecologist does not know general endocrinology but only female endocrinology he will soon lose his place in the endocrine world to the general endocrinologist who is doing clinical and research work on all the organs of internal secretion.

The identification of the endocrine tumors with their special symptoms and low percentage of malignancy has changed the classification of ovarian tumors. These lesions with their ability to produce femininity or masculinity and abnormal genital development are not entirely understood, but great strides have been made in the past 25 years and our knowledge of the lesions constitutes a valuable demonstration of the great value of pathology in our specialty. In the separation of these tumors into their proper categories, in the understanding of the changes in the endometrium, and in the diagnosis of cancer in situ and so many other conditions, the value of the gynecologic pathologist has been proved. It is essential that such a trained pathologist be available in our gynecology departments.

Meigs's syndrome, (20) an entity consisting of a fibroma of the ovary with fluid in the abdomen and in the chest, and which is cured by removal of the fibroma, is important. It mimicks cancer of the pelvic organs with metastases to the chest. Benign ovarian cysts and tumors accompanied by fluid in the abdomen and chest were reported by gynecologists in 1905 and before, but in the 50 years that we are discussing, no reports were made discussing this entity as a syndrome until 1937 (25). It is an important syndrome as it simulates inoperable cancer. There are other groups of cases, such as ovarian cysts or cancers of the ovary that simulate the true syndrome; these have been given the name of pseudo-Meigs's syndrome (21). Some patients with cancer of the ovary may have fluid in the abdomen and chest and this may even be bloody fluid, and yet the fluid may be innocent and no cancer present in the chest cavity. Excision of the tumor may cure the patient.

Endometriosis. Special interest arises in this lesion, which was first carefully described by one of America's most illustrious gynecologists, John A. Sampson (30). It was this truly great investigator who published the first important work on endometriosis in 1921 and other articles in the following years. Since then interest has been great, perhaps greater than in any other gynecologic problem. Hundreds of articles have been written about this fascinating condition. Sampson's thesis on the ability of menstrual endometrium to pass through the tubes and implant itself on the peritoneum is very probably true. The recent experiments of Te Linde and Scott on monkeys (32), which seem to confirm Sampson's thesis, deserve great praise. The extension of endometrium through the lymphatics had been emphasized by Halban (10) and lately by Javert (15), and certainly the finding of lymph nodes containing endometriosis in patients who have had the radical operation for cervical cancer upholds their contentions. Infrequent and late childbearing is a definite factor in patients suffering from endometriosis. Most patients with endometriosis have married late and have had none, one, or but two children. Lack of childbearing may not be the etiologic factor, but certainly all studies point to the importance of having children early before endometriosis develops. Once endometriosis has occurred it may be a definite factor

in a patient's inability to conceive. One of the great modern advances in the treatment of endometriosis is the knowledge that the chocolate cyst in the ovary, up to a large size, can be shelled out from the ovary and the ovary be reconstructed with a very good chance of subsequent pregnancy. Conservative surgery in endometriosis is important and castration, except in the very extensive cases and in the patients near the menopause, should be avoided.

Cancer of the female pelvis. The last and most important of the unsolved problems is that of cancer of the female pelvic organs. The two important methods of attack are radiation and surgery. The problem in cancer therapy is first whether to use radiation or surgery, or a combination of the two. Essentially we need criteria to know whether a given tumor is sensitive or resistant to radiation and, if surgery is contemplated, whether or not metastases have occurred. There can be no doubt that both methods of treatment are important, but because of a 20 to 25 per cent failure in the early cases with either method it must be obvious that either a tumor may be autonomous (8) or the method of treatment used was not satisfactory. At the present time many studies are under way to determine from biopsy specimens or from cells in the vaginal smear whether or not radiation or surgery should be used (4) (6). Radiation therapy was not used by the gynecologist of 1905 as the first use of radium in the treatment of this disease was that of Margaret Cleaves (according to F. A. O'Brien (13)) of New York City in September, 1903. Radiation treatment has been improved steadily since its introduction until now it is nearly at a standstill. However, the introduction of radioactive cobalt in tube, needle, or threads and the use of radioactive gold and other isotopes is giving new scope to radiation methods. However, the only important basic changes in therapy since its beginning are the addition of x-ray treatment and the institution of more accurate methods of measuring dosage. The present use of the gamma roentgen measurement has supplanted measurement by milligram or millicurie hours or by erythema dose. The use of the dosage rate meter, capable of being introduced into the bladder or rectum during radium treatment, is a great addition for by this means the number of gamma roentgens per minute can be accurately calculated. A knowledge of physics is necessary for the roentgenologist and physicist to determine dosage in gamma roentgens and this makes them important members of the team treating cancer. The gynecologist with his knowledge of pelvic anatomy, surgery, and pelvic cancer, must also understand the principles of radiation if he hopes to continue in the role as captain of the team in charge of radiation treatment of cervical cancer. That the treatment is now a team endeavor is very clear; the gynecologist, radiologist, and physicist must work together.

In the early years of the century surgery was the method of treatment, but the mortality of 9 to 20 per cent was prohibitive. The advent of radiation therapy completely side-tracked further surgical consideration, except in a few Continental and English Clinics. The operation as then done was either the abdominal operation of Clark, Ries, or Wertheim, or the vaginal operation of Schauta. Competition was great between the vaginal and the abdominal method, but except for the lower mortality from the vaginal attack the abdominal method was far better for it allowed dissection and removal of lymph nodes. In the 1905 volume of SURGERY, GYNECOLOGY, AND OBSTETRICS Ries (26) and Sampson (29) both express the opinion that it might not be wise to combine the radical operation with node dissection as the mortality in the extended operation was too high and the cure of patients with positive nodes too low. At the present moment this same discussion is under careful consideration by modern gynecologic surgeons. However, the 5 year results in stage I are satisfactory in patients with positive nodes, but in stage II the results are poor. Recent work is very suggestive that radiation may destroy cancer in pelvic lymph nodes (7), a controversial subject in recent years. In these modern days, although surgical approach to the treatment of cancer is obviously a mutilating and a destructive method, surgical mortality has been reduced to a minimum. The injuries to the ureter and the lack of normal function of the rectum and the bladder militate against the operation as being the ideal method. Treatment of cervical cancer with hormones, as in cancer of the prostate and the breast, has not shown any real promise so that the surgical and radiological approaches, crude as they are, remain the only methods at our disposal. Because of bladder and ureteral injuries and because of the extended removal operation advised in stages III and IV (1), knowledge of urologic surgery is of increasing importance to the gynecologic surgeon. Trans-

plantation of the ureter to the bowel or bladder is a piece of technique essential to the gynecologist. Methods of colostomy and resection of the intestine must be a part of the technique of the modern gynecologist.

The treatment of cancer of the endometrium is also changing as it has become obvious that the same nodes are involved in this cancer as in cancer of the cervix. The usual operation for this disease has not progressed since 1905 when total hysterectomy with removal of both tubes and ovaries was the operation. In our time the question as to the advisability of preoperative radium or x-ray therapy, or postoperative radium or x-ray therapy is much discussed. There are some who believe that radiation is not necessary or important (19). The time to operate after a radium application was always considered to be 6 weeks after therapy. In recent years we have been operating on endometrial cancer 5 days after radium treatment, whereas the proper time, according to changes in the vaginal smear following radiation, indicates the fourteenth day after radium treatment and the twenty-first day after x-ray treatment (5).

The treatment of cancer of the vulva has gradually changed to the one stage radical operation with removal of the superficial and deep inguinal, obturator, and iliac nodes, and removal of the mons veneris. The operation can be staged into two or three operations, but most old people with vulval cancer will stand one-stage surgery well. Certainly the results of the radical operation are superior to the results of the smaller operations of the early century operators.

Cancer of the ovary remains our most difficult and most unsatisfactorily treated cancer and no significant advance in treatment has been made since 1905. The older gynecologists recognized that both ovaries were often involved, and their procedure, usually the correct one, was to remove them with the uterus, but more often than not the cervix was left in place. Sometime further advances will be made in the diagnosis and treatment of this condition, just as in cancer of the cervix. The problem of the value of removing most of the diseased ovaries and radiating the areas left behind is still undecided. The area of tumor left behind should be radiated and the use of dura clips to demonstrate that area to the radiologist is of great and necessary importance. The omentum, so often involved in ovarian extension, probably should be removed—even if not involved at the time of operation. It has been advocated that the uterus should be left behind to be used as a nidus for radium, but this suggestion has not been generally adopted (12, 18).

Cancer in situ of the cervix, recognized since Rubin's description in 1910 (28), has become one of the great problems. While not known in the early part of the century, it is now so frequently recognized and probably so inadequately recognized as to become not only a great value to us but a great hazard. Unquestionably, cancer in situ which may or may not progress into invasive cancer must be more thoroughly studied by general and gynecological pathologists. Standards should be set so that all practicing gynecologists can interpret the laboratory reports. Certainly harm has been done by incorrect diagnoses and it remains for the changes in the cervical epithelium to be better and more carefully studied.

New tests. There are many new tests of importance that have been devised and that add to the modern gynecologist's methods of diagnosis and treatment. Those of importance to us clinically are the pregnancy tests, the endometrial biopsy, endometrial suction, the Papanicolaou test for cancer, the use of the colposcope, the culdoscope, the Schiller iodine test, hysterosalpingography, and the Rubin test (uterotubal insufflation). There are even other tests that have made it easier for us to evaluate certain conditions and states present in the female.

Discussion. Once again let me reiterate that this is a discussion of gynecology and not of obstetrics. Without doubt the two are allied but the gynecologist should never be allowed to forget the importance of surgical training.

It must be evident to all gynecologists that certain gynecologic problems have been solved and that there are many others that need further study and investigation. Gynecology has never been static and some of the greatest surgical advances have come from the researches of the gynecologist. He must, however, be cognizant of the fact that in these days of the increasing scope of his surgery and the increasing importance of endocrinology and radiology, his specialty may be divided unless his training undertakes to provide basic training in more than diseases of women's genital organs. The need for basic training in the problems of general surgery and general endocrinology is great. How can the gynecologist with a short training in obstetrics and gynecology hope to cope with the problems of

radical surgery for cancer and more especially with ultraradical operations for cancer without the fundamental training of the general surgeon? It would seem that at least 2 years' exposure to the methods of general abdominal surgical problems would be not only advantageous but an absolute necessity before a gynecologist performs the radical cancer surgery necessary today. That the gynecologist of the first part of the century was so trained is clear from the discussions held at their meetings. Many of these men were general surgeons and they participated in discussions on gastric ulcer, gallbladder disease, breast disease, and even thyroid disease. They were among the great contributors to the problems of appendicitis. Specialization is very important, but such specialization must not lose sight of the fact that the competent abdominal or pelvic surgeon must be acquainted and schooled in the treatment of any intra-abdominal lesion. Surely gynecologists well versed in radical operations for cancer of the cervix can do the various operations for cancer of the colon, rectum, and bladder equally as well as—and in some instances perhaps better than—the general surgeon, but such gynecologic surgeons have been exposed to general surgery as a part of their training. The plight of a gynecologist calling for a surgeon when he unexpectedly finds a cancer of the colon or rectum is humiliating. Each gynecologist should learn the techniques for, and surgical care of, such problems. Knowledge of the lymphatic channels and blood vessels of the pelvis, as the gynecologist should have when doing radical operations for cancer of the cervix, should make him eminently qualified to do any type of pelvic surgery. Blood vessel surgery and replacement of arteries with grafts should be part of the training of anyone undertaking radical pelvic surgery, as the problem of irreversible spasm of the external iliac artery and of other large vessels involved by cancer is always present. Repairs of the ureter, knowledge of its blood supply, and transplantation of the ureter into the bladder or bowel must be part of his knowledge. It is not pleasant to hear of exenteration cases being done by gynecologists who must call in the urologist to do the ureterobowel anastomosis and a general surgeon to supervise the colostomy. The training of the modern gynecologist should make him independent and able to carry out any surgical maneuver that might arise in operations he undertakes.

General endocrinology is in some measure in the hand of the medical services and undoubtedly the gynecologist must either learn general endocrinology or have a general endocrinologist available for consultation. The mere knowledge of estrin and progestin does not classify the gynecologist as an endocrinologist. More training along general lines is essential if the gynecologist is to be a satisfactory physician to trust with an endocrinologic problem.

So also is it important that more training be given in radiology and physics if the gynecologist is to carry out the modern radiation treatment of cervical cancer. No doubt he can still apply the radium more expertly than the radiologist, but knowledge of the dosage and the placement of his applicators is more important. The knowledge of gamma roentgen dosage and the physics of measurement must be mastered by the well trained gynecologist.

Psychiatric medicine is, of course, important for the gynecologist but training in the subject may not be so important to the gynecologist as his instinctive knowledge that his patient should see a psychiatrist. Common sense and the ability to listen well to complaints will soon point out to the gynecologist that the problem is too much for him or that simple sound advice will suffice.

The problem of obtaining such ideal training in view of the present qualifications for specialty recognition is a difficult one but certainly some workers who do not wish to do obstetrics could easily qualify for more extensive training in gynecology. Obstetrics is most important in the training of the obstetrician-gynecologist, but if obstetrics is essential for the gynecologist, how much more important is training in surgery for the gynecologist confronted with a surgical problem! It is true that medical gynecology and obstetrics are closely allied, but is it not more important that the gynecologist doing a surgical operation should have all the instincts and knowledge of the trained surgeon? It may be that gynecologic surgery is different from abdominal surgery, but can anyone conceive of this being true? The difficulties encountered by the medical gynecologist are easy for the trained obstetrician, but even if only 10 per cent of the gynecologic patients require surgery, that 10 per cent is of the utmost importance and surgical training must be a part of such a gynecologist's training. If it is important that the gynecologist know obstetrics, how much more important that he know basic

surgical concepts. If 2 years of surgical training were made essential as well as 6 months in general endocrinology and 6 months in radiology, plus 2 years in a gynecologic clinic, the young doctor would be much better equipped to carry out his specialty than he is today. The difficulty of obtaining such training is obvious. However, if this training were made an essential for the young gynecologist certainly all academic teachers would be most certain to provide it. It is easy to recommend certain training periods but it is difficult to obtain them. If, however, a demand were made for such training it is certain that medical schools and hospitals would soon make it available. It is simple to advise a certain ideal of training but it is difficult to obtain it. However, the important thing is to demand in 1955 that which is essential and necessary. Obstetric experience is an excellent thing, but the young gynecologist who does not intend to do obstetrics and wishes to do gynecology alone could obtain sufficient knowledge of obstetrics in 6 months.

Thus, it would seem from a study of the 50 years under consideration that the gynecologist must have greater knowledge of the branches of surgery, endocrinology, and radiology if he is to do satisfactory clinical and investigative work. The gynecologist has a rare opportunity and he should be encouraged to become better trained in the important facets of his specialty.

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A HALF CENTURY OF EFFORT TO CONTROL CANCER

An Appraisal of the Problem and an Estimation of Accomplishments

GEORGE T. PACK, M.D., F.A.C.S., and IRVING M. ARIEL, M.D., F.A.C.S.,
New York, New York

TREATMENT OF TUMORS OF THE GENITOURINARY SYSTEM

The treatment of tumors of the genitourinary system has been scientifically developed during the twentieth century. At the turn of the century the urologist was concerned chiefly with venereal diseases, treatment of urinary retention (either the result of prostatic hypertrophy or urethral stricture), stones, and endoscopic control of diseases of the bladder. In Prince Morrow's "System of Genito-Urinary Diseases, Syphilology and Dermatology," published in 1893, the status of treatment of tumors at the termination of the past century is presented. Fear of intraperitoneal manipulation is evidenced by surgical entrance into the bladder by extraperitoneal routes. Helferich (1888) advocated excision of the symphysis pubis and Langenbuch, also in 1888, practiced a subsymphysial incision after detaching the penile attachments. Entrance into the female bladder was gained by means of a colpocystotomy. By 1891, Sir Henry Thompson reported 41 benign bladder tumors and Francis S. Watson collected only 11 other benign tumors treated by operation by different surgeons. Death or recurrence invariably followed.

Apparently only 4 resections for malignant bladder tumors had been attempted before 1893. One unusual case is the one for which Watson quotes Pawlik who performed a total cystectomy and transplanted the ureters into the vagina.

Belfield, discussing treatment of prostatic cancer, calls attention to pitfalls existent at that time (1891) which are as common today (1955), namely, that diagnosis is not made because of neglect to perform a rectal examination, or when it is performed the prostatic enlargement is considered benign hypertrophy. His experience with therapy consisted of 10 prostatectomies, each unsuccessful.

The discoveries of the latter nineteenth century paved the way for improvement in cancer therapy. The discovery of the cystoscope by Nitze in 1877 led the way, and there have been numerous modifications and improvements by Brown (1893) who first catheterized the ureters in a male, Kelly (1893) who first distended the bladder, Lewis (1903), McCarthy (1923), and more recently Ravich, Lowsley, Young, Braasch, and others. Hugh Young, in 1927, summarized these developments of endoscopy during the first quarter of the century in an article, "A Critique of Modern Cystoscopes."

The utilization of urologic roentgenology was first begun in 1896 when Chapuis and Chauvel first observed roentgenograms of renal calculi. Knowledge of the pharmacology of certain drugs (phenolphthalein, sodium iodide, diodrast, uroselectan, and others) has resulted in the development of urography to a high degree of efficiency. Arteriography, which was first described by dos Santos, Lamas, and Caldas in 1929, is another valuable diagnostic procedure. A combination of cystoscopy, roentgenology, and renal function tests permits a precise diagnosis of most tumors.

Renal Tumors

Grawitz (1883) described a renal tumor which was believed to arise in adrenal rests within the kidney, and was named "hypernephroma" by Lubarsch in 1894. Because of its uncertain histogenesis and because of its morphologic characteristics, Ewing gave the name "clear cell tumor" to this neoplasm.

Wilms (1899) described an adenomyosarcoma of the kidney, which now frequently bears the

eponym "Wilms' tumor." The status of renal tumors at the turn of the century is described in detail in the classic book of Albarran and Imbert, "Tumeurs du Rein," published in 1903. Rarer tumors are those which occur in the pelvis, only about 250 being reported to date.

The poor results following nephrectomy for kidney tumors (15 per cent cures of 99 cases reported by Hyman in 1928), and the observation by Bothe (1926) that Wilms' tumors were radiosensitive has led to a technique of combining irradiation and surgical extirpation in the treatment of nephric neoplasms. This is attended by good results at the Children's Hospital in Boston where nephrectomy is followed almost immediately by radiation therapy.

The observation by V. C. Hunt that kidney tumors may produce ureteral seedings prompted him to report upon better results obtained by a complete nephroureterectomy (1927). The development of the transperitoneal approach for kidney tumors and the more recent use of a combined thoracoabdominal incision (Mortensen and Chute and Soutter) permit excellent exposure for the atraumatic handling of the neoplastic kidney. The classification of renal tumors on histogenic criteria has been correlated with prognosis by Foot, Humphreys, and Whitmore (1951), and offers a workable classification for prognostication.

Bladder Tumors

Today bladder tumors are treated by two approaches, the endoscopic and transperitoneal. When Nitze introduced the operating cystoscope in 1896, a method was available by which tumors could be snared and removed by cautery, and the bleeding points could be coagulated. Among Nitze's 150 treated patients, there was 1 death and 20 recurrences. Further evolution in this method of treatment consisted of the use of the Oudin monopolar current (discovered in 1893) by Edwin Beer of New York in 1910; and in the same year Keyes, Jr. used the bipolar, high frequency current described by d'Arsonval in 1893. The different behavior of bladder tumors following these methods of treatment led Geraghty, in 1915, to classify bladder tumors on the basis of cystoscopic observation into various categories: benign papillomas, malignant papillomas, papillary carcinomas, infiltrating carcinomas.

The high recurrence rate following electrodesiccations was largely responsible for the development of supplementary methods of irradiation. Paschkis (1911), Pasteau and deGrais (1913), and Hugh Young (1917) introduced methods and techniques for introducing radium applicators into the bladder either through ordinary rubber catheters or by means of cystoscopic control. Good results were reported by various urologic surgeons including Scott, McKay, and Colston. However, the infiltrating tumors did not respond and methods were devised to extirpate these neoplasms by partial cystectomy. Young, in 1930, introduced a transvesical method of excising tumors of the posterior bladder wall, thus avoiding entrance into the peritoneal cavity. Early efforts at partial cystectomy and hemicystectomy as advocated by Squire resulted in a high postoperative mortality and a high recurrence rate for those who survived. Barringer (1915) developed the technique of interstitial radon seed implantation either cystoscopically or suprapubically, usually after destruction of the fungating tumor by cautery. This method was used in a great number of patients by Barringer and Dean at the Memorial Hospital, New York. A recent review by Marshall of patients so treated revealed the net salvage rate to be approximately 6 per cent. External roentgen irradiation, either in the medium or supervoltage range, has not been gratifying. The technique of marsupializing the bladder and directly irradiating it was advanced by D. K. Rose in 1935, and the technique of introducing the Chaoul low voltage x-ray directly in contact with the exposed bladder tumor by Levine *et al.* (1939) offers another method of direct irradiation.

The extension of surgical techniques and the development of methods for transplanting the ureters either into the bladder (Israel-1896, first successful transplantation into the bladder) or into the intestinal tract (Maydl-1894, first successful transplantation into the intestinal tract) with improvement of the technique by Coffey in 1910, or directly to the outside, have led to a resurgence of attempts to perform radical cystectomies for bladder tumors. Marshall, Whitmore, and others are current proponents of this technique and have extended it to the performance of pelvic exenteration (1949) in patients with extensive bladder cancer.

Testicular Tumors

Improvements in the treatment of testicular tumors have evolved along three parallel lines,

FACULTE DE MÉDECINE DE PARIS

Année 1906 — THÈSE — N°

POUR LE

DOCTORAT EN MÉDECINE

Présentée et soutenue le mercredi 14 mars 1906, à 1 heure

Par Maurice CHEVASSU

Né à Lons-le-Saulnier, le 28 octobre 1877.
Ancien interne lauréat des hôpitaux (Médaille d'argent, 1905)
Prosecteur à la Faculté de Médecine de Paris
Membre de la Société anatomique

TUMEURS DU TESTICULE

Travail des laboratoires du Professeur Duplay (Hôtel-Dieu) et du Professeur agrégé Quenu (Cochin).

Président : M. RECLUS, *professeur*.
Juges : MM. SEGOND, *professeur*.
PIERRE DUVAL, PROUST, *agrégés*.

PARIS

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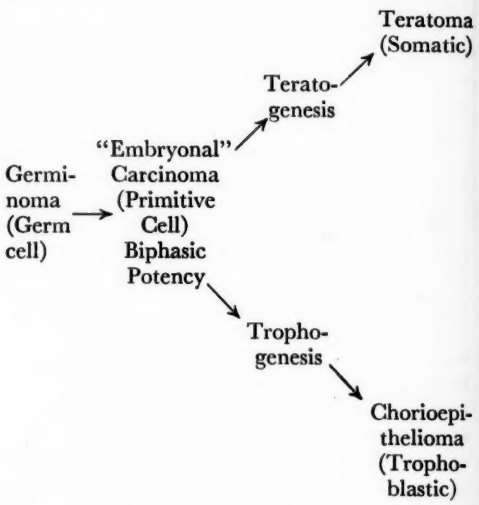
2, RUE CASIMIR-DELAVIGNE, 2

1906

FIG. 38. Title page of Chevassu's thesis describing testicular tumors.

namely, (1) classification, (2) knowledge pertaining to the anatomic routes of dissemination, and (3) knowledge pertaining to degree of radiosensitivity.

Classification of testicular tumors. Wilms in 1896 first described the teratomatous nature of testicular tumors. Ten years later Chevassu, just out of medical school, published his thesis, "Tumeurs du Testicule," in which he made two great contributions: he recognized a separate group of tumors which he believed to be of germ cell origin and named them "seminoma," and he described the retroperitoneal lymphatic drainage from the testes and designed a radical operative procedure for its extirpation. Ewing (1911), after a thorough study of pathologic specimens, believed that most tumors of the testes were of a teratoid nature, and with continued investigation, in 1922, he proposed a classification based upon their origin from germ cells. Friedman and Moore, in 1946, contributed to a better understanding of testicular tumors by outlining the sequential relationship of the two major types of germ cell tumors—those developing as teratomas (somatic) and those developing as chorioepitheliomas (trophoblastic). The following classification is one prepared by Friedman in 1950:



The significance of hormone production by certain testicular tumors was first appreciated by Zondek in 1930 and thoroughly investigated by Hamburger in 1938. Friedman and Moore's classification permits an understanding as to why certain embryonal carcinomas produce chorionic gonadotropin. Ferguson (1933), Hinman (1935), and Dean (1936) demonstrated that although many patients with testicular tumors do not excrete the hormone, its presence is of prognostic value, its disappearance after irradiation represents tumor control, and its reappearance signifies renewed neoplastic activity.

Surgical treatment of testicular tumors. At the turn of the century, tumors of the testes were treated solely by simple orchectomy. Chevassu, displeased with the results so obtained, devised the radical lymphatic dissection in conjunction with orchidectomy. This operation, described in 1910 and modified by Hinman in 1914, has remained the operation of choice in the surgical management of testicular tumors. It is based on the fact that the lymphatic drainage of the testicle drains with the spermatic vessels through the inguinal canals into the retroperitoneal space. In associa-

tion with the study of the embryologic development of the testes, the investigations of Most (1899) and Cuneo (1901) demonstrated that the primary echelon of lymphatic drainage from the testes is to the lymph nodes about the aorta, inferior vena cava, and renal pedicle. Studies of necropsy material by Barringer (1941) and Lowry *et al.* (1946) suggested that abundant intercommunication exists between both sides of the lumbar lymph chains and that early in the course of the disease, contralateral metastases occur. Cooper, Leadbetter, and Chute presented evidence that only early ipsilateral metastases existed in this region, but when the primary echelon contains many metastases, collateral and retrograde dissemination occurred with involvement of the contralateral iliac and lumbar lymphatics. Lewis (1948) has substantiated this premise and called attention to the rarity of metastases to the contralateral nodes in his 169 radical resections for testicular tumors. Metastases to the iliac lymph nodes can occur only when the epididymis is invaded by the tumor, because the epididymis, in contrast to the testes, drains to the inguinal region as demonstrated by Rouviere.

Prior to the understanding of the testicular lymphatic drainage, Stinson (1897) and Villar (1902) advocated inguinal node dissection. J. B. Roberts published the first report of retroperitoneal lymph node dissection for testicular tumors by transperitoneal approach (1902), but his patient died postoperatively from peritonitis. Gregoire (1908) published a report of an attempt to resect metastases from a testicular tumor through a retroperitoneal incision. The tumor was inoperable. Chevassu (1906) devised the extended retroperitoneal node dissection and in 1910 reported 2 successful en bloc resections. Hinman continued the operative attack upon testicular tumors and showed a marked improvement in the 5 year salvage rates over those obtained by simple orchectomy. Present efforts to improve results of the surgical treatment of this group of tumors consist of extending the operation as described by Chevassu and Hinman. Chevassu (1933) recognized the inadequacy of his dissection about the renal pedicle and called this region "la zone critique," and in the same year Hinman stated that the dissection should be continued more proximally and devised operations utilizing extended incisions. Cooper, Leadbetter, and Chute (1950) utilized the thoracoabdominal approach for a complete retroperitoneal node dissection for metastases from the testes.

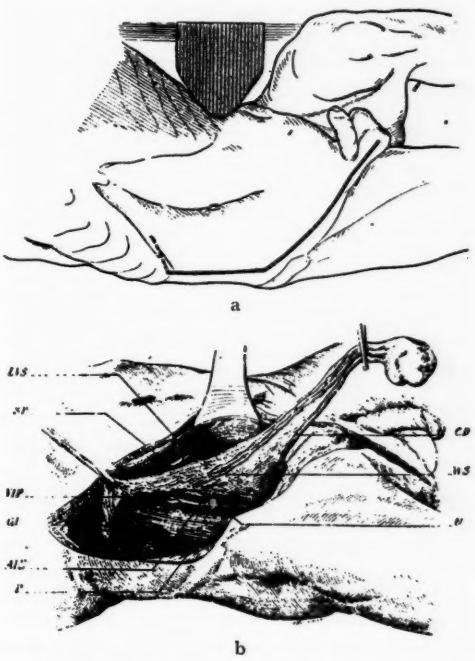


FIG. 39. Illustrations depicting the technique of radical resection of the testicle combined with radical lymphadenectomy.

Radiation therapy for testicular tumors. The observation that certain testicular tumors are radiosensitive has led to the practice of treating them, particularly seminomas, by a radical course of radiation therapy to the lymph node regions. Five year salvage rates of from 50 to 70 per cent can be obtained. Early attempts to take advantage of the skin-sparing effect and better depth dose distribution of supervoltage therapy has resulted in rather severe postirradiation sequelae.

Prostatic Tumors

Prostatic cancer is one of the most frequent cancers afflicting men, being exceeded only by cancer of the gastrointestinal tract and lung. It has been calculated by routine autopsy studies of prostates in men over 50 years of age that occult and possibly latent foci of carcinoma existed in from 14 to 46 per cent. Treatment, to be curative, must be performed early in the course of the disease because of the propensity of prostatic

cancer to extend beyond the boundaries of the gland. Careful investigation by Kahler (1939) demonstrated that cancer may arise from any part of the gland, but the high incidence of cancer in the posterior lobe and the extension of cancer in the perineural lymphatics account for metastases in the bony pelvis in a large number of patients. Colby (1953) painstakingly reviewed the surgical specimens and observed that the perineural extensions within the prostate apparently had no bearing upon the prognosis. However, if extension occurred into the seminal vesicles, the prognosis was worsened. Recent attempts at cellular diagnosis by needle aspiration have been reported but the results are unreliable. Albers, McDonald, and Thompson of the Mayo Clinic, in 1949, reported a study of secretions of 100 patients with clinically benign prostatic hyperplasias, in 3 of whom cancer cells were identified; these findings were confirmed by paraffin study of resected specimens.

Radical perineal prostatectomy, including the seminal vesicles and adjacent bladder neck, is the only method of curing this type of cancer. The operation described by Hugh Young in 1905 has been universally accepted and is performed today as it was originally described 50 years ago. Previous efforts to excise prostatic cancer were partially successful. Billroth is credited with the first perineal prostatectomy for cancer, performed in 1867 through a median incision. Leisrink (1882), Zuckerkandl (1889), and Proust and Albarran (1901) all contributed to prostatic surgery and provided the framework for the operation described by Young.

The delay of diagnosis results in that a few patients become candidates for the curative procedure. From 1934 to 1938, only 190 radical perineal prostatectomies were performed among a total of 1,961 patients with prostatic cancer examined at the Brady Urologic Institute, Baltimore. More recent statistics from the same institution (1938 to 1948) reveal that the incidence of resectability has increased to 17.8 per cent. This represents earlier diagnosis, resections for highly suspicious but not proved carcinomas, or increased indications for resectability. Colby (1953) also experienced an increased operability rate and for patients with advanced cancer performs abdominoperineal resection and a pelvic lymphadenectomy. His mortality is 5 per cent.

Modifications of the perineal prostatectomy are the retropubic prostatectomy popularized by Millin (1947); a modification of this, in which the bladder neck is sectioned vertically, being done by Creevy; and a recently described ischial prostatectomy practiced by Hennig (1952).

Palliation for noncurable prostatic cancer attempts to accomplish two objectives:

1. Relief of the urinary symptoms, especially obstruction. There is diagreement pertaining to the best method of accomplishing this. Some prefer suprapubic cystostomy because of their belief that transurethral resection stimulates growth of cancer and contributes to infection. Others favor the latter procedure.

2. The control of general symptoms and retardation of further tumor growth.

The earliest effects on the prostate of changes in hormonal environment stemmed from orchectomy. In 1836, Leroy D'Etoilles noted "complete disappearance of the prostate in patients who underwent bilateral orchiectomy during the treatment of hernia." Civiale (1837), Gruber (1847), Bilharz (1859), and Pelican (1875) similarly noted reduction in the size of the prostate following orchectomy. Perhaps the first American to perform castration for difficulty in micturition was Tupper (1877) at Bay City, Michigan. In 1893, J. William White of Philadelphia suggested the removal of the testes for prostatic enlargement. He cited nondevelopment of the prostate in eunuchs and had performed successful experiments in dogs showing regression of the enlarged prostate following orchectomy. Microscopic studies showed disappearance of glandular elements. He believed that tumorlike growth of the prostate was due to an excess of unused but continually stimulated energy. In 1895 White published clinical reports on 111 cases of double castration. Better results were seen after orchectomy, with improved micturition, than from prostatectomy at that time because of the high mortality of the latter. In 1938, Strohm used estrogens in advanced carcinoma of the prostate and obtained relief of pain.

Kutscher and Wolbergs, in 1935, reported that normal prostatic tissue is very rich in the enzyme acid phosphatase. The Gutmans found the occurrence of elevated serum acid phosphatase in patients with carcinoma of the prostate. Concentration in vivo was 500 to 2,500 units per gram of tissue. They found a high content of acid phosphatase in undifferentiated carcinoma of the prostate and also in its distant metastases. Invasion of the blood or lymph channels was

found to be accompanied by escape of phosphatase into the circulation, with a consequent elevation of the blood serum acid phosphatase.

In 1941, Charles Huggins made a significant advance in the management of cancer. He showed that prostatic carcinoma, which caused a marked elevation of serum acid phosphatase, was markedly affected by castration or the injection with estrogens. There was a marked reduction in the level of this enzyme and symptomatic improvement. Alkaline phosphatase rose following castration and then decreased more slowly than acid phosphatase. Huggins showed that it is possible for metastatic carcinoma of the prostate to be present in bones when the serum acid phosphatase is normal, but found that when the acid phosphatase levels were greater than 10 units in 100 c.c., disseminated carcinoma of the prostate was present. Three patients with carcinoma of the prostate were treated with androgen injections and in all there was a sharp rise in serum acid phosphatase. The acid phosphatase did not readily cross membranes from the blood since it was present only in trace amounts in the cerebrospinal fluid and in the spermatocele fluid when simultaneously the blood serum level was high. Huggins concluded that prostatic carcinoma is influenced by androgen activity in the body and that the disseminated carcinoma is inhibited by diminishing the androgens by castration or by the administration of estrogens. Carcinoma of the prostate is activated by the injection of androgens. He emphasized that variations in serum acid phosphatase following orchectomy may be due to an extragonadal source of androgen which varies in different individuals. The adrenal gland was thought to be the source of this androgen. The administration of stilbesterol also produced a reduction of acid phosphatase level and clinical improvement. Herbst, in 1941, concluded that estradiol dipropionate and diethyl stilbesterol relieved pain due to local cancer or bony metastases. In 1941, Munger reported on irradiating the testicles of patients with carcinoma of the prostate. An important report in 1950 by Nesbit and Baum summarized 1,818 cases of prostatic carcinoma studied by urologists throughout the country. The conclusion was that the best results with greatest prolongation of life could be expected by a combination of orchectomy and estrogen therapy.

Huggins and Scott (1945) reported bilateral adrenalectomy for carcinoma of the prostate and noted a marked reduction in 17 ketosteroids to less than 2 mgm. per day. They were able to keep several of their patients alive for several months at that time with the help of George Thorn, adrenocortical extract, and DOCA. Some clinical improvement was observed during the survival of several months. As a result of this work the extragonadal source of androgen was presumed to be the adrenal cortex because of the marked reduction observed after adrenalectomy.

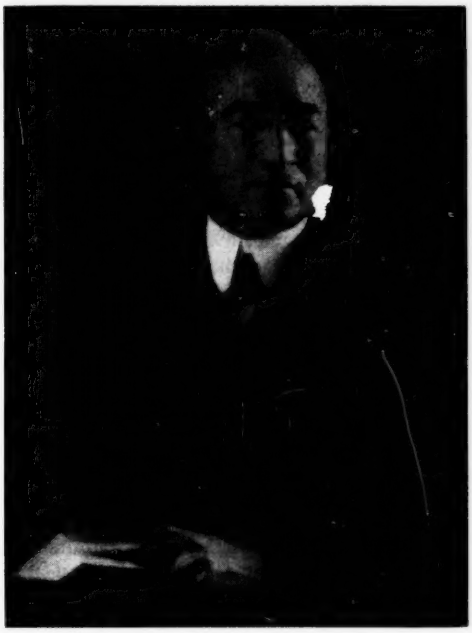


FIG. 40. Hugh Young.

Huggins and Bergenstal (1952) reported on the benefits of total adrenalectomy for reactivated carcinoma of the prostate. Life could now be maintained by cortisone administration.

Colston administers estrogens and performs an orchectomy for extensive primary prostatic cancers, and he has observed shrinkage of the tumor, which permitted prostatectomy. Harrison *et al.* have also used this technique since often reactivation of the primary tumor after hormone therapy is the troublesome feature.

Tumors of the Penis

The knowledge pertaining to etiology, prophylaxis, natural history, and effective measures of treating penile cancer has evolved during this

century. The recognition that Jews, who are circumcized shortly after birth, practically never develop cancer of the penis presents a method of complete prophylaxis against this form of cancer. The reason that circumcision during boyhood or early manhood does not exert the same protection remains enigmatic. A statistical study by Schrek (1947) pertaining to etiologic factors in carcinoma of the penis demonstrates the fact that poor hygiene is a causative factor. Demographic studies indicate that the highest incidence is found in Asia (Ngai-1933), particularly among the Chinese and among the Javanese of Indonesia. In Europe penile cancer accounts for 5 per cent of all male cancers and it is relatively rare in the United States.

Knowledge of the lymphatics of the penis has been developed by Cuneo and Marcille (1901). Based upon this knowledge, Young (1931) devised an operation which consists of radical amputation of the penis, including the dorsal lymphatics, combined with bilateral inguinal and femoral lymphadenectomy. Hudson, Cason, and Scott (1948) presented the results of radical surgical extirpation. Six of 19 patients with proved metastatic carcinoma were well and apparently free of cancer more than 5 years. Various forms of local excisions and conservative amputations have been advocated (Lenowitz and Graham, 1946; Zausner, 1948). Bassett (1952) reported on 78 patients with penile cancer from the Ellis Fischel Hospital. One-third of these patients had proved metastases to the groin. Results following the treatment of patients with metastases are uniformly poor.

A number of studies have been presented throughout this century pertaining to irradiation for penile cancer (Barringer, 1924; Berven and Heyman, 1921–1947; Cade, 1931; Dean, 1926–1929–1935; and others). Irradiation appears inferior to surgery for treating this form of cancer. It is apparently for certain tumors of low grade malignancy. Its use for inguinal metastases is almost invariably unsuccessful.

Adrenal Tumors

Classification. Our knowledge of adrenal tumors presents a major advance. Based on their classification, their effect upon the anatomy and physiology, methods of diagnosis, preoperative and postoperative care, and techniques for their extirpation have been developed. The morphologic classification has divided these tumors into those arising from the cortex and those arising from the medulla, the benign cortical adenomas being divided into functioning and nonfunctioning neoplasms. The tumors arising from the medulla are divided into the following four categories: ganglioneuromas, pheochromocytomas, neuroblastomas, and mixed types. Cahill (1941) has divided the functional cortical adenomas according to the type of hormonal alteration produced: (1) androgenic—speeds maturity in immature males or makes females masculine; (2) estrogenic—makes males effeminate; (3) those producing mixed sexual or other metabolic changes; and (4) those producing Cushing's syndrome. McGavack (1940) has reported that cortical carcinomas may also produce the hormonal alterations.

Diagnosis. Diagnosis of the cortical tumors is established by the classical symptom complexes and measurement of the 17-ketosteroids of the urine (Johnson and Nesbit, 1947). Diagnosis of pheochromocytoma can be made by a variety of drugs, as follows: by histamine (Roth and Kvale, 1945) or etamon (LaDue *et al.*, 1948) in patients whose blood pressures are normal between hypertensive paroxysms; by the adrenolytic drug, benodaine, or the adrenolytic and sympatholytic drug, regitine, in patients with persistent hypertension, which will reduce the blood pressure (1949, 1950). Knowledge of the behavior of neuroblastomas, described by Pepper and Hutchinson in the early years of this century, permits a diagnosis of this neoplasm.

Treatment. The first successful removal of an adrenocortical tumor was performed by Holmes (1924). Charles Mayo (1927) removed what proved to be a pheochromocytoma, but was described by him to be a "retroperitoneal malignant blastoma." Howard and Barker credit Pincoffs and Shipley as the first to make a correct preoperative diagnosis and surgically remove a pheochromocytoma which had produced paroxysmal hypertension.

The treatment of neuroblastoma has been successfully developed by the physicians of the Children's Hospital in Boston who combine surgical extirpation with radical postoperative irradiation. Various techniques have been developed. The transverse abdominal incision is used for cortical adenomas by Lukens *et al.* (1937). A recent review by Rapaport *et al.* (1952) indicates an operative mortality of 34 per cent. The operative mortality for resecting pheochro-

mocytomas has been reported as 26 per cent by Graham (1951) who analyzed 207 cases, of which 125 were operated upon. An operative procedure described by Grimson, Emlet, and Hamblin (1951) employs a bilateral transthoracic and transdiaphragmatic exposure of the adrenal glands.

BONE TUMORS

Many of the advances in the treatment of bone tumors have been based upon the establishment of a classification with a subsequent better understanding of the natural history of the various subgroups. Some of these include fibrous dysplasia of bone first described in 1922 by Wieland and later enlarged by Albright (1937) to include dermal pigmentation and endocrine dysfunction with precocious puberty in females; osteoid osteoma, described by Jaffe in 1945; giant cell tumors of bone, first described by Sir Astley Cooper (1818) and studied extensively by Ewing, Mallory, and Stewart. The Hand-Schüller-Christian syndrome (1915–1921), Letterer (1924)-Siwe (1933) syndrome, and eosinophilic granulomas of bone described by Lichtenstein and Jaffe (1940) have been extensively investigated and are believed by some to represent the same disease process.

The production of osteogenic sarcoma by irradiation was stressed by Martland's description (1931) of workers who ingested radium while painting clock dials. Cahan *et al.* (1948) reported an additional 11 instances of this sarcoma which occurred in sites irradiated years previously.

Ewing's sarcoma was recognized as a distinct entity and was shown to be very radiosensitive but not radiocurable. Reticulum cell sarcoma was identified as separate from Ewing's sarcoma, and cures of this entity have been reported.

Blood chemical methods were developed to give indices of bone tumor metabolism. Extensive studies of serum alkaline phosphatase have been carried out by Woodard, who has correlated alterations in the serum phosphatase with bone tumors in various stages of activity.

The effects of irradiation upon bone tumors and normal bones have been exhaustively investigated, and the accomplishments and limitations of controlling neoplasms of the skeleton by radiation therapy have been established. The surgical treatment of bone tumors has become standardized. Evolving from the practice of local excision or caustic destruction of neoplasms, it was found that the nature of certain bone tumors necessitated the most massive and mutilating operative procedures. With understanding regarding the behavior of many of the subvarieties, Phemister (1945) reverted to a more conservative repair by massive bone grafts. The safe performance of some of the radical amputations has been a rather recent development.

Interscapulothoracic Amputation

Interscapulothoracic amputation is an operation devised to remove the entire upper extremity, the shoulder girdle, and its muscular attachments. The operation has been variously designated as "removal of one-half of the shoulder girdle" by von Eiselsberg, "surgical removal of the breast girdle" by Adelmann, and "extirpation of the arm and shoulder" by Kocher, but it is the term "interscapulothoracic amputation" that the French surgeons, notably Berger, have employed which now enjoys popular usage.

In the "Anatomy of the Human Body" by W. Cheselden, there is a note and illustration concerning the case of Samuel Wood, a miller, who in 1737 survived a traumatic amputation of an arm and scapula, caused by an entwined rope attached to the cogs of a mill wheel. Only slight shock was said to have followed this amputation by avulsion. The English surgeon, R. Cuming, has been generally accredited with having performed the first elective operation of this type, which was for a gunshot wound, although Halstead maintained that Larrey was the originator of the formal procedure as it is done today. Dixi Crosby, in 1836, was the first American surgeon to perform a successful extirpation of the shoulder girdle for tumor. In 1837, Mussey of Hanover, New Hampshire did a scapulectomy following a disarticulation of the humerus for sarcoma; the patient survived 30 years.

Until 1881, i.e., before the era of antisepsis, there were 29 recorded interscapulothoracic amputations for various indications with an operative mortality of 38 per cent. The technique of the operation was standardized by Berger, and the classical procedure still bears his eponym; in 1887 he described all the previously published cases and added his own experience with the operation, for which his mortality rate was 10.4 per cent. The most important article dealing with this subject in medical literature was written by Buchanan of Pittsburgh, who analyzed all the reported cases prior to the year 1900. At

that time the operation was so unusual as to be a surgical curiosity and surgeons were inclined to rush their individual case reports into press before their final end-results could be appreciated. Buchanan, by letter and consultation, secured most of the follow-up data on 141 interscapulothoracic amputations which were done prior to the year 1900.

Indications. The indications for this operation may be enumerated as follows:

1. Nonneoplastic conditions, such as extensive trauma with irreparable damage, gunshot wounds, tuberculosis, incurable osteomyelitis. These will not be discussed.

2. Intractable pain caused by incurable tumors of the shoulder girdle even though metastases to the lungs are present. The purpose here is palliation only, getting rid of a cumbersome, painful, often suppurating extremity (Polosson, Jeanbrau). This indication is not so valid now that intolerable pain in the shoulder and arm can often be controlled by such measures as cervical chordotomy and posterior rhizotomy.

3. All malignant tumors requiring disarticulation of the humerus at the shoulder. The more major procedure in our experience does not require the penalty of a higher operative mortality. The deformity is greater but suitable prosthetic appliances are available and any good tailor can reconstruct the shoulder of a coat. The shoulder without the arm is practically useless. There can be no argument about the greater freedom from local recurrence which interscapulothoracic amputation affords.

4. Many bone sarcomas proximal to the elbow. Periosteal sarcomas, sclerosing osteosarcomas and others of low grade malignancy, those well confined to the bone, and those involving the lower half of the humerus may be treated by more conservative amputations at the discretion and experience of the operator. However, the majority of the other bone sarcomas, particularly those involving the upper end of the humerus, those extending upward through the entire medullary cavity, and those which have extended beyond the confines of the bone to infiltrate the surrounding normal tissues are more suitable for interscapulothoracic amputation.

5. The rule of Halstead and Corner that the amputation should be performed above the proximal attachments of the muscles which pass over it. Although this is a good fundamental principle, it is perhaps too radical to be all-inclusive, because some neurosarcomas and osteosarcomas of low grade malignancy may be treated more conservatively.

6. All malignant tumors invading the shoulder joint capsule.

7. Infiltrating malignant tumors involving the deltoid, subscapularis, and pectoral muscles. This rule applies invariably to the unencapsulated neurosarcomas, rhabdomyosarcomas, and fibrosarcomas, but exceptions are admitted in the case of liposarcomas and the occasional lymphosarcomas which extend beyond the lymph nodes to involve the surrounding soft tissues. In the case of the latter two tumors, preliminary radiation therapy or even irradiation alone is the procedure of choice. Encapsulated neurosarcomas, liposarcomas, or rhabdomyosarcomas may be successfully treated in some instances by radical dissection of the muscle groups containing these tumors with preservation of the extremity.

8. Inoperable axillary tumors adherent to the blood vessels, brachial plexus, shoulder joint and muscles, which permit no attempts at local excision, however radical.

9. Sarcomas of the clavicle or scapula. Interscapulothoracic amputation is indicated for these tumors only when their location is so intimate to the shoulder joint that partial or complete scapulectomy or resection of the clavicle would not be possible or feasible, and especially if the arm is useless and painful. The entire scapula may safely be removed without too great disability and with preservation of the arm, if it is involved by chondrosarcoma or osteosarcoma of low grade malignancy.

10. Relatively benign tumors causing symptoms and disability because of their size and location, e.g., certain huge chondromas developing in the neighborhood of the shoulder joint.

Hip Joint Disarticulation

Amputation through the hip joint is an operation that even now is not undertaken lightly. In the early years of the last century, when sepsis attacked most every wound and anesthesia was unknown, it must have demanded more than ordinary courage for both the surgeon and patient. Amputation through the hip joint was first successfully performed by Walter Brachear of Bardstown, Kentucky, in August, 1806, for a comminuted, compound, multiple fracture of the femur in a 17 year old mulatto slave boy. A

midthigh amputation was carried out, at which time the major vessels were ligated. The bone was then exposed up to the head of the femur on the outer aspect of the thigh and the head of the femur was disarticulated—all of this without anesthesia or antiseptics. Brachear never published an account of his operation.

The earliest recorded instance of a well conceived surgical amputation through the hip joint was made by Sir Astley Cooper. The operation was performed at Guy's Hospital on January 16, 1824. The patient was a 40 year old white male whose limb had been amputated just above the knee some years before. The femur had "become diseased from the extremity of the stump to the trochanter major." The actual removal of the limb took 20 minutes, and the ligation of the major vessels and application of a dressing 15 minutes more. The patient became faint during the operation but revived on the administration of wine and the admission of fresh air. He bore the operation with extraordinary fortitude. After it was completed, he said to Sir Astley Cooper that it was the hardest day's work he had ever gone through, to which Sir Astley replied that it, too, was almost the hardest he had ever experienced. The final note is as follows: "August, 1825: This patient perfectly recovered, and is now living at the country residence of Sir Astley Cooper." (Eckhoff.)

Many of the early hip joint disarticulations were performed by such famous surgeons as Billroth, Trendelenberg, McBurney, Wyeth, Senn, and Halstead.

Disarticulation of the Innominate Bone (Hemipelvectomy)

An excellent review of the historical development of this operative procedure from the first attempt by Billroth in 1891 is presented by Gordon-Taylor and Wiles. Following Billroth's experience, several unsuccessful attempts were made, and in 1895 Girard performed the first successful resection. Pringle in 1916 presented his experience with 4 cases. In 1935 Gordon-Taylor and Wiles recorded 5 instances in which transiliac resections were performed, and in 1946 Gordon-Taylor and Patey presented the records of 21 personal cases (the largest series reported) and reviewed the literature to that year. Morton introduced the procedure to America.

Indications for hemipelvectomy. Hemipelvectomy is indicated for those neoplasms which involve the hip joint, pelvic parietes, or soft tissues of the iliac region which cannot be surgically extirpated by more conservative methods. The following tabulation classifies the various diseases for which this procedure may be indicated.

1. Primary malignant neoplasms of the innominate bone, such as osteogenic sarcoma and periosteal fibrosarcoma.

2. Primary malignant neoplasms of the femur which have invaded the hip joint.

3. Cancer of the soft somatic tissues of the upper thigh, inguinal region, or buttock which have invaded the hip joint or extended through the obturator foramen to involve the pelvic parietes.

4. Metastases to the iliac region which have infiltrated the hip joint, the pelvic parietes, or which, because of local extension, have precluded extirpation of the disease by less radical procedures such as radical groin dissection. In this group are included:

a. Metastases from primary epidermoid carcinomas or sarcomas of the lower extremity.

b. Metastases from malignant melanoma which cannot be treated by hip joint disarticulation or radical groin dissection.

c. Metastases from carcinoma of the penis or rectum in certain selected cases.

d. Metastases from distant primary tumors, as kidney carcinoma or thyroid carcinoma.

In all instances in which the resection is performed for metastases, the primary neoplasm must be controlled or controllable.

5. Certain massive benign tumors of the innominate bone, as chondroma, osteochondroma, or tumors of the somatic tissue of the pelvic area (neurofibroma), if they cannot be resected adequately by other less radical procedures.

6. For palliation in certain instances of generalized metastases: melanoma, Kaposi's hemorrhagic sarcoma, spindle cell sarcoma in which a lesion of the groin produces a bulky infected and painful mass which cannot be controlled by any other modality.

The evolution of prostheses and the education of amputees have recently developed to a high degree as a result of World War II. Kessler has been a most active student of this form of rehabilitation.

SARCOMAS OF THE SOFT SOMATIC TISSUES

Methods for treating sarcomas of the soft somatic tissues have been modified because of

increased knowledge of the natural history of the various tumors which comprise this group. A classification based on histogenesis has resulted in an orientation regarding the nosology of this group of tumors. At the turn of the century most of these neoplasms were designated by the generic term "sarcoma" or by some nondescript descriptive adjective such as "spindle cell sarcoma." Treatment under these circumstances was hampered by lack of knowledge pertaining to the behavior patterns of these specific tumor types which determine the methodology adopted to attempt a cure. The improvement in the pathologist's ability to diagnose the various subgroups of these neoplasms has afforded the surgeon not only indications for the extent of resectability but also data for prognostication (see classification).

Features pertaining to the natural history of soft somatic tissue tumors which affect treatment include the question of whether a benign somatic tumor ever becomes malignant. Certain benign tumors do become malignant on occasion. Diffuse fibromas unencapsulated and incompletely excised have repeatedly recurred with increasing cellularity and anaplasia, until finally their invasive properties qualify them as malignant growths or fibrosarcomas. Desmoid tumors of the abdominal wall diagnosed clinically and histologically as benign have recurred repeatedly (especially with subsequent pregnancies) and have even metastasized diffusely throughout the abdominal viscera. In neurofibromatosis or von Recklinghausen's disease of the peripheral nerves, at least 10 per cent of the patients develop malignant nerve tumors. These sarcomas are of low grade malignancy and the cure rate is quite high. In a group of several thousand angiomas (hemangiomas and lymphangiomas), only 3 instances are recorded in which angiosarcomas (malignant angioendotheliomas) developed from pre-existing benign angiomatous neoplasms after intervals of 4, 12, and even 18 years.

The benign giant cell tumor of the tendon sheath and the hypertrophic synovial tumorlike aborescence which occurs around the joints are not known to become malignant, but instances of malignant synovioma arising from apparently benign, solid, encapsulated synovial tumors have been observed. The answer to the controversial question whether a lipoma ever becomes a liposarcoma may be answered in the affirmative. This complication must be extraordinarily infrequent when we consider the rarity of liposarcomas and the well known frequency of lipomas. A xanthomatous, myxomatous, or degenerative change may occur in these lipomas, and in this portion of the tumors liposarcomas have arisen, metastasized, and caused death.

Surgical Dissection of Sarcomas of Soft Somatic Tissues

The choice between radical surgical dissection and amputation for sarcoma depends on innumerable factors, such as the histogenesis, the degree of malignancy, the regional location, the fixity or mobility, the primary or recurrent status, the presence of regional and distant metastases, and, most important perhaps, the experience and judgment of the operator.

Many sarcomas are spherical, oval, encapsulated, or pseudoencapsulated, and the temptation simply to enucleate them is great; the ease with which such tumors can be shelled out and their apparent complete localization gives the surgeon a false sense of security. In the compromise of selecting local removal instead of amputation for these malignant tumors, the surgeon should not relax his vigilance in accepting simple enucleation as an easy substitute for the always essential radical dissection. The entire group of muscles involved by, or encompassing, the sarcoma from their origins to their insertions must be removed in certain instances. This precaution is especially warranted in the case of the rhabdomyosarcomas and intermuscular liposarcomas. If the sarcoma is on the extremities, the order of the dissection is from above downward, i.e., disengaging the superior limits of the tissue dissection first. If the sarcoma is situated near the attachments of muscle or fascia to bone, we invariably remove the periosteum at this site and in some instances chisel away the cortex of bone. In these radical local removals, ruthless removal of adherent or implicated arteries and nerves is practiced. In the case of sarcomas of an extremity, partial loss of function is not too great a price to pay in lieu of amputation, for the preservation of the limb in the treatment of an otherwise lethal disease.

Sarcomas of the chest wall should be attacked most aggressively at the initial attempt in an all-out effort to cure, inasmuch as one cannot resort to amputation if recurrence develops. Because of adherence to the ribs or intercostal extension of the sarcoma, radical removal of large segments

CLASSIFICATION OF SOFT PART SOMATIC TUMORS*

Type of Tissue	*Benign Tumors*	*Malignant Tumors*
1. Fibrous tissue	a. Fibroma b. Keloid c. Dupuytren's contracture d. Peyronie's disease of penis e. Desmoid tumor of abdominal wall (desmoma) f. Progressive fibrosing myositis (Meyenburg's disease) g. Dermatofibrosarcoma protuberans	a. Fibrosarcoma b. Dermatofibrosarcoma protuberans
2. Undifferentiated mesenchyme	a. Myxoma b. Mesenchymoma	a. Myxoma b. Mixed cell sarcoma (mesenchymoma)
3. Heterotopic bone and cartilage	a. Myositis ossificans	a. Osteogenic sarcoma b. Chondrosarcoma
4. Adipose tissue	a. Lipoma (solitary and multiple) b. Congenital diffuse lipomatosis	a. Liposarcoma
5. Blood and lymph vessels	a. Hemangioma b. Systemic angiomatosis c. Rendu-Osler-Weber's disease d. Neuroangiomatous syndromes e. Lymphangioma f. Cystic hygroma g. Glomus tumor h. Hemangiopericytoma	a. Angiosarcoma b. Lymphangiosarcoma c. Angioendothelioma d. Kaposi's idiopathic sarcoma e. Granulation cell sarcoma f. Hemangiopericytoma
6. Lymphatic and reticuloendothelial tissue	?	a. Malignant lymphocytoma b. Reticulum cell sarcoma c. Brill-Symmer's disease (giant follicular lymphoma) d. Mycosis fungoides e. Plasmocytoma f. Hodgkin's disease
7. Synovial mesothelium	a. Giant cell tumor of tendon sheath b. Synovial xanthoma c. Hypertrophic arborescent synovioma of joints	Malignant synovioma (synovial sarcoma)
8. Smooth muscle	a. Leiomyoma b. Dermatoleiomyoma	a. Leiomyosarcoma
9. Striated muscle	a. Rhabdomyoma b. Granular cell myoblastoma	a. Rhabdomyosarcoma
10. Peripheral nerves	a. Neurofibroma b. Neurofibromatosis (von Recklinghausen's disease) c. Schwannoma (neurilemoma or perineurial fibroblastoma) d. Ganglioneuroma e. Paraganglioma (benign) 1. Carotid body tumor 2. Pheochromocytoma 3. Carcinoid tumor?	a. Malignant schwannoma b. Neurosarcoma c. Neurocytoma d. Paraganglioma (malignant) 1. Carotid body tumor 2. Pheochromocytoma 3. Carcinoid tumor

*This classification is modified from the working table adopted by the Panel on Soft Part Sarcomas, (Chairman: Arthur Purdy Stout) National Cancer Conference, Memphis, Tennessee, 1949. It is presented here because the nosology represents a major advance in the therapy of these neoplasms.

of the thoracic bone cage is occasionally necessary, but the resultant wound can be closed by thoracoplastic measures. Rib resections, sliding skin flaps, transposed muscle groups, free fascial transplants, and metallic mesh inserts can close the surgical defects. The same technical difficulties are encountered in the surgical treatment of sarcomas of the abdominal wall. The surgical excision of some sarcomas of the abdominal parietes is a formidable undertaking, requiring the sacrifice of large muscle groups and fascial planes; in many patients the entire thickness of the abdominal wall must be excised and the problems of wound closure are troublesome. The retroperitoneal tumors are usually neurogenic or lipogenic (schwannoma, ganglioneuroma, lipoma, liposarcoma) and may assume bulky proportions before evoking symptoms leading to their discovery. The technical difficulties in their removal are usually surmountable, although at

times a repair or even excision of the inferior vena cava is necessary. The proclivity of these retroperitoneal tumors to recur locally is well known. The intrathoracic schwannomas, ganglioneuromas, and lipomas are generally located in the posterior mediastinum; their surgical removal is a comparatively easy feat. Excluding lymphomas, the most frequently encountered tumor in the anterior mediastinum is the dermoid inclusion cyst.

As an adjunct to local surgical removal, the possible value of radiation therapy must always be considered. Instances wherein technically inoperable sarcomas have become resectable and curable through the agency of preoperative irradiation have been described. In other patients the judicious use of combined surgical and radiation treatment has permitted a radical surgical dissection to be done instead of an amputation of an extremity. The therapist making these decisions should have some knowledge of the radiosensitivity of various sarcomas and of the fundamental principles of irradiation.

Sarcomas of the soft somatic tissues do metastasize to the regional lymph nodes. One of the fixed ideas which have wrongly persisted about the behavior of cancer is the opinion that sarcomas metastasize solely through the blood vascular system and carcinomas metastasize via the lymphatics. Regional dissection and microscopic study of nodal masses have sometimes shown lymph nodes partly or wholly replaced by metastatic sarcoma. The three varieties of malignant mesenchymal tumors which more commonly metastasize to regional lymph nodes (seldom higher than 20 per cent) are rhabdomyosarcoma, malignant synovioma, and spindle cell sarcoma of undetermined histogenesis. The acceptance of this fact and the anticipation of this occasional occurrence now exert a definite influence in planning the scope and technique of surgical treatment. It furnishes the indications and the logic for the operation of excision and dissection in continuity for primary tumors and metastases to regional lymph nodes.

Principles of amputation for sarcoma of the extremities. In each individual case, there is a constant battle of judgment between the wisdom of the more radical amputation and the need for preservation of an important functional part. So many factors interplay here, such as the regional involvement of the tumor, its primary or recurrent status, histogenesis, degree of malignancy, and encapsulation or infiltrative method of growth, that no set formulary for management can be established. Experience will continue to influence the operator in every circumstance.

The upper levels of severance must be high if not extreme. The general rule of amputation above the level of origin of the muscle groups involved by the sarcoma is a good principle to observe. Arguments supporting this thesis may be adumbrated in the following summary:

1. The rhabdomyosarcomas may be multicentric, and impalpable nodules may exist in superior segments of the muscle and be discovered later if the muscle is not entirely removed.

2. Many sarcomas extend imperceptibly high along the muscular and fascial planes.

3. The diffuse fascial fibrosarcomas certainly must be removed above the level of the fascial attachment to bone. Even to leave the periosteal base at this site increases the hazard of recurrence.

4. Malignant neurilemmomas of the extremities extend high along the nerve sheaths and with coexistent moniliform beading of the nerve trunks commonly seen in the peripheral manifestations of von Recklinghausen's disease it is difficult at the operating table to be certain of the safe level of amputation.

5. Invasion of bone (as distinct from pressure atrophy and necrosis) may result in subperiosteal and intramedullary extension of the sarcoma superiorly and inferiorly; therefore amputation should be through or above the joint with which the affected bone articulation is indicated.

If the sarcoma involves the elbow or necessitates removal of the elbow, leaving only a stump of the upper arm, the conventional midhumeral amputation or shoulder joint disarticulation should be abandoned, usually in favor of the safer, more radical, and equally crippling interscapulothoracic amputation. The arguments for this conclusion are: the frequency with which certain malignant tumors of the soft tissues metastasize to the axillary lymph nodes, the tendency of certain sarcomas (notably the fascial, or fibrosarcomas and neurosarcomas) to extend centripetally upward along the fascial planes or nerve sheaths, and, finally, the admission of a small advantage in possessing the stump of the upper arm and shoulder other than the cosmetic one of serving as a coathanger. An artificial limb of this type cannot be appended with good function other than to hook and carry. The

operation of humeral disarticulation should be deleted from the category of cancer surgery; there is no circumstance in which the interscapulothoracic amputation for tumors of the upper extremity is not a better operation.

In the case of the lower extremity, the various features of the sarcoma and its treatment should be weighed with care. More importance is given to the conservation of the upper thigh, because even a small stump will permit the comfortable wearing of an artificial limb. The ability to walk with a prosthetic extremity is an advantage over hip joint disarticulation, although even after this latter operation some proud patients will persist in wearing a cumbersome artificial leg.

The 5 year cure rates which have been obtained for the different sarcomas of the soft somatic tissues are reported from the Memorial Hospital Series:

Type of Tumor	*Per cent*
Malignant neurilemmoma	59.4
Liposarcoma	35.9
Rhabdomyosarcoma	35.3
Fibrosarcoma	55.6
Synovioma	21.6
Angiosarcoma	27.3
Dermatofibrosarcoma protuberans	69.2
Sarcoma of undetermined origin	40.8
Total Cases	39.2

CHANGING ASPECT OF CANCER MORTALITY AND CURABILITY: MORTALITY TRENDS BY SITE OF CANCER

Skin

Between 1900 and 1910, there was a sharp increase in mortality from cancer of the skin (2.1 to 2.7 per 100,000). After that the rate leveled off and began to decline steadily, so that by 1950 it was 2.3.

Buccal Cavity and Pharynx

Mortality from cancer of the buccal cavity and pharynx has followed a trend similar to that of cancer of the skin. The rate in 1950 was 3.4 per 100,000. It accounts for about 3 per cent of all cancer deaths.

Digestive System

Deaths from cancer of the digestive system, breast, and female genital organs account for two-thirds of all cancer deaths. Cancer of the digestive tract alone is responsible for 45 per cent of all deaths from cancer. The death rate per 100,000 population for cancer of the digestive system has risen from 28.3 in 1900 to 57.5 in 1945 and 54.4 in 1950. However, during the past 20 years there has been an apparent leveling off of death rates in this group with, in fact, a 15 per cent decline in the mortality for females. It is probable that the apparent leveling off in the death rates from cancer of this system is due to changes in diagnosis and methods of reporting deaths rather than to an actual decrease in incidence of this type of cancer, because the improved rate for the entire system has been due to a decline in death rates for cancer of the stomach (20.2 in 1920 to 18.8 in 1945 and 16.2 in 1950) and for cancer of the liver and biliary passages (9.9 in 1920 to 8.0 in 1945)—cancers which carry the least favorable prognosis. During these same years the mortality rates from cancer of the rectum and anus and of the intestines—more favorable cancers—have almost doubled (3.2 to 6.8 for rectum and anus, and 7.2 to 15.4 for intestines).

Breast and Female Genital Organs

Cancer of these organs accounts for 50 of every 100 cancers in the female. Even though these sites are relatively accessible and carry a favorable prognosis if treated in early stages, there has been no improvement in the mortality rates.

Death rates from cancer of the breast have shown a steady increase, from 5.1 per 100,000 in 1900 to 12.3 per 100,000 population in 1945. Since the incidence of breast cancer in men is very low, a better indication of mortality can be gleaned from an examination of the death rate per 100,000 females in the population. Thus, for 1930 the rate was 18.5; for 1940 23.3; and for 1945, 24.2. However, the rate of increase is slowing down and there are some indications that the peak in mortality may have been reached.

Cancer of the female genital organs has maintained a rather level mortality rate during the past 25 years. Cancer of the uterus, by far the greatest cause of death in this group, had a death rate of 24.1 per 100,000 females in 1930 and 24.7 in 1945. In 1900, the mortality rate for cancer of all the female genital organs was 16 per 100,000 females; in 1930 it was 28, and in 1945, 32.

Lymphoma

Deaths from leukemia and Hodgkin's disease have been listed variously in the vital statistics reports since 1900. However, a definite rise in

TABLE I.—CANCER CURES—PAST AND PRESENT

	Report of Ewing (1940)				*Steiner (1953)*
Organ	*Rate of selected cases (per cent)*	*Five Year cures average (per cent)*	*Possible cures under ideal conditions (per cent)*	*Present cures (per cent)*	*Possible cures under ideal conditions (per cent)*
Stomach	5	1	5	6	35
Intestine and rectum	5	2	10	15	65
Lung	0.1	?	1	5	50
Uterus	35	10	40	20	75
Breast	33	10	35	50	75
Liver, gallbladder	2	1	5	2	7
Prostate	5	1	10	7	25
Bladder	35	15	40	15	30
Skin	70	60	85	85	98
Pancreas	1	?	2	1	5
Esophagus	0.1	?	1	3	20
Ovary	5	1	10	15	30
Bone	5	2	10	5	15
Larynx	20	5	50	20	75
Brain	5	2	10	10	20
Oral cavity	25	15	50	15	40
Kidney	2	1	5	10	20

the death rate from leukemia became obvious after 1930, and by 1945 it was 75 per cent higher than the 1930 rate. The mortality rate in 1950 was 5.8. The rate for males is about one-third higher than for females. The death rate for Hodgkin's disease has doubled since 1921 and is still increasing. The total death rate from the two diseases is only about 5 per cent of the total death rate from all cancers.

Respiratory System

Cancer of this system shows the largest relative increase in mortality rates of all the major systems. It was reported very rarely during the early years of this century, but has increased so rapidly that it now accounts for about 10 per cent of all deaths from cancer. In 1930 the reported death rate for all cancers of the respiratory system was 3.2 per 100,000 population and in 1950 it was approximately 14 per 100,000. The death rate for cancer of the respiratory system is about four times higher in men than in women. Cancer of the lung accounts for more than 50 per cent of the deaths in this category. In 1940 the rate was 4.1 and by 1945 it had risen to 5.8. There is agreement that many more lung cancers are now being correctly diagnosed, but not early enough to be apparently benefited by treatment.

The larynx is the other major site of cancer of the respiratory system, but the mortality has increased less rapidly than that from cancer of the lung (0.6 per 100,000 in 1920 to 1.2 in 1950). The mortality rate for cancer of the larynx in men is about ten times that in women.

CURE RATE TRENDS

Table I presents the alterations in cure rates according to the location of the cancer. A definite improvement is noted for some cancers, e.g., those of the breast and lung, whereas for others there is no apparent improvement. The possible cures under the most ideal conditions as estimated by Ewing in 1940 have been reached and exceeded for cancers of the stomach, intestine and rectum, esophagus, and other organs. There has been a decided net gain.

ADDENDUM.—The authors have not included in this review the important subject of tumors of the central nervous system because their limited experience in this field renders them incapable of presenting it adequately.

We express our appreciation to those physicians who kindly presented, in answer to our queries, those contributions to the cancer problem which they considered of paramount importance and which data were incorporated into this review.

We acknowledge particularly the liberal use of certain reviews which include the following: Cancer chemotherapy—Alfred Gellhorn, Logan Jones, and David Karnofsky; cancer research—Jacob Furth; occupational and environmental cancer—W. C. Hueper; organization of cancer societies—Charles Cameron and Brewster Miller; roentgen therapy—George E. Pfahler; radiation dosimetry—Edith Quimby; history of irradiation—Otto Glasser; cancer of the head and neck—Hayes Martin; thyroid—Thomas McGavack; breast cancer—Edward F. Lewison and Cushman Haagensen; lung cancer—Evarts Graham; cancer of esophagus and stomach—Owen Wangensteen; cancer of colon and rectum—Leland McKittrick, Robert Grinnell, Cuthbert Dukes, and Robert Turell; cancer of the pancreas—Richard Cattell and Kenneth Warren; carcinoma of cervix in situ—Howard C. Taylor, Jr.; cancer of the female genital tract—Stanley Way.

ERRATUM.—Figure 6 a and b in Part I of this review appearing in the April issue should have been credited to Margaret R. Murray and Arthur Purdy Stout.

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ABSTRACTS OF CURRENT LITERATURE

SURGERY OF THE HEAD AND NECK

EYE

Effect of Increased Oxygen Concentration on New Vessel Growth in the Adult Cornea. I. C. MICHAELSON, N. HERZ, and D. KERTESZ. *Brit. J. Ophth.*, 1954, 38: 588.

THE AUTHORS conducted an experiment to determine if an increased concentration of oxygen in the blood has any effect on vessel budding in the adult eye. For this experiment they chose rabbit's cornea, in which they produced a standard thermal lesion near the limbus. The six animals were then placed for 6 days in an incubator having an oxygen concentration of 50 per cent. Similar lesions were made in 4 control rabbits which were maintained in ordinary atmospheric conditions. A comparison was made between the vascularization found in the two groups of animals.

Changes in the concentration of oxygen in the blood have seemed to contribute to a disturbance of development of retinal capillaries which manifests itself as retrolental fibroplasia, but when the extent of the vessel growth in the incubated animals and in the control animals was measured and compared it was found that the increased concentration of oxygen did not affect the extent of new vessel growth in the adult cornea. —*Joshua Zuckerman, M.D.*

Delayed Restoration of the Anterior Chamber; the Eighth Proctor Lecture. PETER C. KRONFELD. *Am. J. Ophth.*, 1954, 38: 453.

THE AUTHOR discusses the significance of the condition of the anterior chamber after globe-opening operations or injuries. Its depth has always served to indicate the progress of the healing process. The development of peripheral anterior synechias after prolonged absence of the anterior chamber has pointed out how dangerous such absence can be. Demonstration of the pupillary block mechanism as a probable cause of shallowness of the anterior chamber has also stimulated renewed interest in this phenomenon.

The purpose of this study was to determine the effects upon the ocular tension-regulating mechanism of delayed restoration of the anterior chamber, in the several distinct clinical situations in which such delayed restoration occurs.

The rate of reformation of aqueous was studied on nearly normal human eyes by aspirating the contents of the anterior chamber.

Comparison between the rate of reformation of the anterior chamber and the rate of restoration of the ocular tension was interesting.

The progress of the healing of a cataract wound is judged not only by the speed with which the anterior chamber assumes aphakic depth, but also on the basis of how this depth is maintained postoperatively.

Absence of the anterior chamber was associated in about 30 per cent of cases with gross signs of leakiness of the wound, such as gaping of the incision between sutures, pale edema of the flap, a positive Seidel test from one of the suture sites or from a gap between the lips of the conjunctival wound, and a very low tension. In another 20 per cent of cases, the same signs were present to a lesser or more indefinite degree.

The absence of gross signs of fistulization does not rule out the possibility of its presence. The recognized causes of fistulization of a cataract incision are: incarceration of tissue acting like a door jamb, malposition of the lips of the wound resulting from improperly placed sutures, deep sutures acting as drainage wicks, poor healing, and accidental sclerectomies.

Although postoperative absence of the chamber is nearly always self-limited, the form of treatment that is most logical is surgical exploration and repair by excision of the incarcerated tissue and by use of additional corneoscleral sutures. If the wound is distorted by one of the corneoscleral sutures, or if wick action is present, removal of the offending suture is indicated. Cauterization of the suture sites or of the parts of the conjunctival or corneoscleral wound suspected of fistulating was equally effective. In cases which presented no apparent leak, the topical application of strong cholinesterase inhibitors, such as eserine and di-isopropylfluorophosphate was effective in better than 1 of 9 trials. Powerful mydriatics were used in cases of pupillary block.

Restoration of the anterior chamber by means of air injections has been effective either alone or combined with release of the suprachoroidal fluid between the detached choroid and sclera.

Cases of "pure" glaucoma secondary to absence of the anterior chamber after cataract operation respond well to miotics. Those which do not are treated by cyclodialysis to separate the peripheral anterior synechias.

Reduction in the amount of aqueous production may be a factor in the restoration of the anterior chamber. —*Joshua Zuckerman, M.D.*

Normal Vitreous, Its Attachments and Dynamics During Ocular Movement. A. C. HILDING. *Arch. Ophth.*, Chic., 1954, 52: 497.

THE VITREOUS rotates as the eye rotates but because of its inertia the former lags considerably behind. Hence, during rotation of the eye the anterior portion of the vitreous moves in relative counter-rotation, while in the postrotational phase the vitreous flows rapidly in the direction of rotation. Since the velocity of eye movements is greatest at the middle of the rotational movement, the strain upon the attachments of the vitreous is greatest at this time. The greatest strain is in the upper outer quadrant and consequently most retinal tears occur there. This suggests that, with the exception of disinsertion, the minor rather than the major attachments determine retinal tears. The base of a typical tear lies anteriorly and occurs when the vitreous has a relative forward movement.

—*James E. Lebensohn, M.D.*

Treatment of Cysts of the Iris with Diathermy Coagulation. DERRICK VAIL. *Am. J. Ophth.*, 1954, 38: 513.

IN SURGICAL EXCISION of implantation cysts of the iris, mutilation of the pupil invariably results and recurrence frequently follows incomplete removal. Radiation therapy is most uncertain in its results. Diathermy coagulation is at present the simplest and most efficient method for destroying cysts of the iris. Opacification of the cornea at the puncture sites is inevitable but this does not affect vision since the scar is at the limbus.

In 3 cases a traumatic implantation cyst of the iris was thus destroyed successfully. One to four punctures were made with a very fine diathermy needle through the cornea into the cyst, utilizing 10 to 35 milliamperes of current for 1 to 2 seconds. In one case a recurrence after 6 months was finally obliterated by a second diathermy application.

—*James E. Lebensohn, M.D.*

Effect of Increased Oxygen on the Development of the Retinal Vessels; an Experimental Study. I. C. MICHAELSON, N. HERZ, E. LEWKOWITZ, and D. KERTESZ. *Brit. J. Ophth.*, 1954, 38: 577.

THE AUTHORS TESTED the effect of hyperoxia on the developing vessels of the mouse retina, which is similar in development and pattern to that of the human retina.

This was done because clinical evidence seems to indicate that retrolental fibroplasia is the result of a disturbance of the oxygen conditions to which an infant is normally exposed.

Among animals of equal age, the degree of diminution of capillary growth in the retina was related to the degree of development of the animal, in that absence of retinal capillaries was found only in underdeveloped animals. This might mean that the retina of an underdeveloped animal is particularly sensitive to hyperoxia or that the retina as well as the rest of the body was comparably affected by hyperoxia.

The authors describe the normal development of the retinal blood vessels in the mouse and the development of these vessels after the animals had been in an incubator in high concentrations of oxygen.

The following findings were observed in the retina of animals exposed to high oxygen concentrations:

The extent of the vessel outgrowth from the optic disc was not grossly affected by the change in oxygen concentration; there was a delay in the formation of the capillary bed situated around the optic disc; in underdeveloped animals there was complete absence of capillaries in the retina; concentrations of oxygen between 40 and 70 per cent appear to give fairly comparable results; and the normal capillary pattern was established within a few days of the return of the animal to normal atmospheric conditions.

The authors suggest that the gross diminution in the number of retinal capillaries resulting from hyperoxic conditions may represent the early stage of the pathology of retrolental fibroplasia and may explain cases in which milky pallor of the fundus and optic atrophy are more prominent signs than neovascularization.

The association of underdevelopment with the retinal vessel changes found in hyperoxia is mentioned and the role of the choroid in the production of retinal vessel abnormalities due to hyperoxia is speculated upon.

—*Joshua Zuckerman, M.D.*

Uveitis with Glaucoma and Retrobulbar Neuritis. M. HARRY COHEN and MAX CHAMLIN. *Am. J. Ophth.*, 1954, 38: 615.

THE AUTHORS report in detail a very interesting case of primary anterior uveitis with secondary glaucoma as well as secondary retrobulbar neuritis. The literature on uveitis with these complications is reviewed, and the differential diagnosis is discussed in detail. The authors believe that this condition is not as rare as the literature appears to indicate, and that in many cases involvement of the optic nerve is overlooked. It is suggested that a severe loss of vision in cases of uveitis, not accounted for by hazy media alone, may be due to central, caecocentral, or paracentral scotomas resulting from the involvement of the optic nerve. It is therefore urged that in cases of uveitis patients be watched for loss of visual fields as an indication of optic nerve involvement.

—*Ray Karchmer Daily, M.D.*

EAR

Long Term Results with the Fenestration Operation. EDWARD H. CAMPBELL. *Arch. Otolar.*, Chic., 1954, 60: 265.

IN EVALUATING the long term results of the fenestration operation, consideration must be given to the immediate results in patients properly selected and operated on, the so-called final results after a period of 1 or 2 years, and the results after a period of 5 or more years. In addition there are several factors that have no bearing on the fenestration operation itself that must receive consideration in properly evaluating the final result.

The material for the report on the results 5 or more years after fenestration consists of 200 cases which were carefully studied by personal observation, and frequent audiometric examinations over a 5 to 8 year period following the surgery. These cases have been divided into three groups. One group consists of 130 patients in whom the operation has been successful. A

second group consists of 49 patients in whom the operation has not been successful due to lack of improvement of hearing to the practical level, or, following satisfactory improvement, a later loss. In the third group of 21 patients, hearing was improved to a practical level with subsequent loss to the preoperative level or below. All of these 21 had subsequent revision operations.

In the 130 successful cases, the average preoperative loss was 49.2 decibels in the three speech frequencies. The average loss 1 year after operation was 27.1 decibels and at the end of 5 years the average loss was 27.6 decibels. Forty-three of these, 7 years or more after operation, showed an average loss of 28.2 decibels.

In the 49 unsuccessful cases, the average preoperative loss was 50.6 decibels. The average loss after 1 year was 42.8 decibels and after 5 years was 49.2 decibels.

In the 21 patients who had successful results for a few months and then lost the improved hearing and were reoperated upon, the average loss before operation was 45.8 decibels. The average loss before revision was 50 decibels. Only 9, or 45 per cent of the 21 revisions, were successful.

Study of the 130 successful cases reveals that the average loss at the end of 5 years was only 0.5 decibels worse than at the end of 1 year. It thus appears that any patients who maintain a satisfactory improvement of hearing for 1 year after operation will retain the hearing without further significant loss for at least 5 years. In the 49 unsuccessful cases the results show a gradual continuing loss during the years subsequent to the operation. The 21 additional unsuccessful cases do not qualify for a long term study because of the revision done in from 1 to 3 years after operation.

In evaluating the results of fenestration surgery, very careful observation and testing of the patient is necessary in order to arrive at accurate conclusions. Certain factors that have no direct connection with the surgery will influence postoperative data. These include psychological reactions, of which one of the most common is the feeling that the hearing in the operated upon ear is failing when it is actually the worsening of hearing in the other ear that leads to this conclusion by the patient. Another fault lies in the inattention or carelessness of the patient in response to the hearing tests.

The fenestrated ear is still subject to depression of hearing as a consequence of colds, allergic reactions, and secretory otitis media. Obviously any audiogram taken when these conditions exist will be inaccurate. Other conditions that tend to give false audiograms are fatigue, emotional disturbances, nervous disorders, and increased tinnitus. Secondary auditory nerve degeneration, further advancement of the otosclerotic process, and intralabyrinthine hypertension will cause hearing loss, but have no bearing on the success or failure of the fenestration operation.

The most common factor in unsuccessful cases is bony or fibrous closure of the fenestrum. In a patient operated upon before the stapes has become completely fixed, hearing will worsen if the stapes later becomes completely fixed. The second most common cause of failure of the operation is postoperative serous labyrinthitis. The severity of the labyrinthitis determines the degree of harmfulness of the labyrinthine reaction. Primary or secondary infections of the ear cavity lead to failure. Primary infections, although not common, are the more serious. Perforations of the drum membrane will also cause failure, but most of these will heal spontaneously or with treatment. Some failures are due to the wrong preoperative diagnosis, and there is the occasional case in which the examiner is deliberately deceived by a patient who wants the operation. Knowing what response is necessary, he will indicate good bone conduction when actually the deafness is of a perceptive type. —*Fletcher Austin, M.D.*

NOSE AND SINUSES

Epistaxis in Hypertension. Oscar H. Killen. *Irish J. M. Sc.*, 1954, 6: 427.

Epistaxis increases in frequency from the third year until puberty; it is then more rare until late in life. Epistaxis is a common complication of hypertension and arteriosclerosis.

Little's area or Kiesselbach's plexus on the nasal septum is the commonest site of hemorrhage. However, in hypertensive patients the lateral wall and the posterior segment of the septum are the more common sites.

Cardiovascular epistaxis usually starts with a sudden and severe hemorrhage. Many hypertensives, when seen, are found to have normal or low blood pressure—a result of shock due to hemorrhage.

The author recommends first the method of treatment described by Trotter: prop the patient up with a comfortable inclination to one side, arrange a large pad of wool for him to dribble into, put a dental prop between the teeth, forbid him to breath through the nose or to swallow, and give a substantial dose of morphine. Transfusions are given when required. Usually no complications are encountered with this treatment, but 31 per cent of patients treated by nasal packing develop complications.

When possible, the bleeding area is cauterized. The author discusses the various methods of anterior and postnasal packing.

If all other methods fail, it becomes necessary to stop the hemorrhage by occlusion of the bleeding vessel or the main trunk from which it springs.

Bleeding from above the middle turbinate comes mainly from the anterior and posterior ethmoidal areas. Using the Ferris Smith approach, the anterior artery is occluded by a silver clip and the posterior artery is treated by diathermy. For hemorrhage below the middle turbinal bone, the easiest vessel to ligate is the external carotid. More recently ligation of the internal maxillary artery has been recommended.

The author reviews 80 cases of epistaxis associated with hypertension which were admitted to the Royal Victoria Infirmary. Fifty-six (70%) patients were successfully treated by Trotter's procedure; 8 patients were treated by cauterization; packing was resorted to usually when simpler methods had failed; 16 patients had nasal packs, preferably with ribbon gauze damped with liquid paraffin. The complication rate was 31.25 per cent.

In 32 cases (40 per cent) the exact site of bleeding was not determined; bleeding was septal in 12 cases, from the roof in 11 cases, and occurred posteriorly on the lateral wall in 25 cases.

No relationship could be found between the severity of hemorrhage and the blood pressure, source, or age of the patient. Sex was not relevant. The older patients appeared to become shocked more quickly and more easily, and required a longer stay in the hospital.

—*John R. Lindsay, M.D.*

MOUTH

The Past, Present, and Future in the Surgery of the Cleft Palate. R. J. V. BATTLE. *Brit. J. Plast. Surg.*, 1954, 7: 217.

PROGRESS in the treatment of cleft lip and palate deformities has been slow. The author states that: "At a time when it is suggested in the United States that the palate operation should be postponed, we have seen no paper from them on the speech results after cleft palate repair. Similarly, in several papers on cleft palate speech results that have appeared over here, there have been few remarks on maxillary deformity."

The author suggests four classes of clefts:

Class 1. The prealveolar cleft, in which the floor of the nose is intact and the alveolus is notched.

Class 2. The postalveolar cleft, in which the alveolus is intact, the vomer remains central, but the palate is affected. These clefts may be associated with a Class I cleft in the same patient.

Class 3. The unilateral peralveolar cleft, in which the floor of the nose is deficient, the alveolus is interrupted on one side or the other, and the cleft continues backward in continuity to the uvula. The vomer is attached along the central border of the cleft. In a very small subdivision of this group the palate has united behind a twisted alveolus.

Class 4. The bilateral and peralveolar cleft, in which the Class 3 deformity exists on both sides in the lip and alveolus with a vomer that is centrally placed. In a few patients of this group also the palate has united behind a deformed alveolus, but in these the premaxilla remains out of position and mobile, the vomer remaining free along its palatal border.

The Class 1 deformity presents no problem to the surgeon. The repositioning of teeth in the lateral incisor region is purely a task for the orthodontist.

The Class 2 deformity is repaired with use of the Wardill-Kilner modification of the Veau technique and by operating before the patient is 2 years of age. The author finds normal speech in 80 per cent of these patients.

The Class 3 and Class 4 deformities present more vexatious problems. The surgical contribution to the treatment of this deformity is to establish muscle union in front of the alveolus. There is thus introduced a new constriction factor of an extrinsic nature that immediately crystallizes out the deformity. Within a period of 3 months the alveolar gap is reduced, but the distortion on the main fragment remains and the small fragment tilts even further into the wrong position. The author has followed up 37 patients in this class. The lip was repaired at 3 months of age, and the palate at 1 year. All of these patients are old enough to talk. Speech is normal in 31 patients and poor in 6.

The Class 4 deformity is treated by the Denis Browne principle of setting the premaxilla back into the maxillary arch. The repositioning is combined with repair. In a series of 13 double lip clefts operated upon by the author, the palate being repaired at 1 year of age, reasonable maxillary contour was obtained in only one patient.

Of all the patients born with lip and palate clefts, only some 50 per cent, those with complete unilateral or bilateral clefts, need be considered as serious orthodontic problems. These problems exist before any surgical intervention whatever, and are accentuated by the lip repair and perpetuated by the palate repair.

The article is well illustrated with models and photographs of the various types of patients.

—*Frank W. Pirruccello, M.D.*

Metastatic Tumors of the Oral Cavity. IRVING SALMAN and IRWIN LANGEL. *Oral Surg.*, 1954, 7: 1141.

METASTATIC TUMORS of the jaws, as reported in the literature, are comparatively rare. The reason for this is that routine examination of the jaws for secondary lesions is by study of roentgenograms of the skull. With skull radiograms, there is an overlapping of both sides of the mandible and the presence of any bone changes may not be detected. Intraoral and extraoral films should be included when looking for metastatic lesions. It is believed that more of these lesions would be found if this routine were carried out.

The authors report 11 cases of metastatic tumors. In 7 of these, discovery of the lesion in the oral cavity led to finding the primary and other metastatic lesions.

In the present report, several additional cases of metastatic lesions to the jaws are reviewed. The primary site was the breast in 2 cases, and the kidney, uterus, prostate gland and lung in 1 case each.

The dentist has a responsibility to the public for the discovery of these benign and malignant growths of the oral cavity.

—*John R. Lindsay, M.D.*

Surgical Treatment of Oral Cancer. M. R. EWING. *Brit. J. Plast. Surg.*, 1954, 7: 108.

THE PRESENT ARTICLE is confined to lesions anterior to the tonsillar pillars and not involving primary cancers at the base of the tongue or tonsils. It is based for the most part on the teachings and practice of Hayes Martin, at Memorial Hospital, in New York. In England, it is customary for patients with oral cancer to be treated first by the radiologist. Cases which are unsuitable for irradiation are referred to the surgeon. They comprise those cases which (1) show bone involvement, (2) fail to respond to irradiation, (3) are intolerant of dose needed to cure, and (4) have recurred despite adequate irradiation. Previous irradiation makes subsequent operation exceedingly difficult. In the United States, interest in primary surgical management has been revived with the advances in anesthesia, antibiotics, and transfusion. Therefore, the author advances a plea for primary surgical management of these cases.

Before undertaking such surgery, the following factors should be considered: (1) confirmation of diag-

nosis by biopsy; (2) accessibility (generally speaking, all tumors of the mouth can be rendered accessible by suitable division of soft tissues and bone); (3) local extension should be determined by adequate visual and digital examination; (4) it may be wise to consider removal of precancerous lesions such as leucoplakia simultaneously; (5) lymph node metastases should be determined, and any adenopathy assumed to be malignant, unless disproved; (6) ability to remove the tumor completely (valuable palliation may follow incomplete removal, and extensive resections are not recommended unless aimed at a cure); (7) immediate surgical risk (the operation is usually tolerated well even in the elderly and debilitated patient); (8) postoperative morbidity (excessive morbidity is most often due to poor wound healing, particularly in patients having had previous heavy irradiation, and respiratory difficulties are not infrequent); (9) curability; and (10) functional result (though wide resection is mutilating at times, unchecked cancer is even more so).

Having decided on surgery, meticulous attention is paid to mouth hygiene preoperatively. Carious teeth should be removed. Feeding is instituted preoperatively through a urethral catheter passed nasally. Endotracheal anesthesia is used with the fauces well packed. The operation is planned to remove the cancer and all its extensions, including any tissue with precancerous changes, and any heavily irradiated tissue which can be sacrificed in the interest of better healing. A simultaneous neck dissection is favored.

The operation is begun as a standard block dissection, using the double "Y" incision. The contents of the neck are turned up to the mandible. The lower lip is split in the midline and a cheek flap retracted, the jaw divided, and the tumor and block of neck tissue are removed together. At the time of extirpating the cancer, the surgeon should not be influenced by the difficulties of subsequent repair. Every effort should be made to achieve primary closure of the mouth in one stage. This can be done even when more than half the floor has been sacrificed with the greater part of the tongue. Covering the mucous lining is usually a greater problem than that of skin coverage; the remaining portion of the tongue is invaluable in this respect. It may be necessary to sacrifice part of the normal mandible at times, to permit closure. When the operation is properly performed, the wound will heal in 7 to 10 days.

Certain disabilities may follow primary repair. These include (1) narrowing of the oropharynx, which may require temporary tracheotomy; (2) tethering of the tongue which may interfere with swallowing and speech, and may cause coughing by spillage over into the glottis; (3) loss of the jaw, causing difficulty of mastication and inability to wear a denture. There is little disfigurement from loss of half the jaw, but removal of the anterior middle third is far from pleasing, while the operation of total glossectomy results in great disfigurement, with the chinless profile, redundancy of the lower lip with troublesome drooling, and inability to close the mouth.

The author suggests that the surgeon excise the cancer without inhibitions with regard to closure and that the plastic surgeon then complete the procedure. He enumerates four main ways in which the plastic surgeon can be of help: (1) by planning of incisions to assure immediate skin coverage; (2) by using, at time of excision, all remaining healthy tissue, by avoiding as much as possible disabling sequelae, and taking such steps as may facilitate later plastic repair; (3) by relieving disabilities in the early postoperative period when there is some chance of ultimate cure; (4) by late reconstruction after 1 or 2 years have elapsed and recurrence is less likely.

By following this regimen, the advantages of surgical extirpation without the stigmata of high morbidity and poor result will be attained.

—*Carl Schiller, M.D.*

Tumors of the Condyle and Temporomandibular Joint. KURT H. THOMA. *Oral Surg.*, 1954, 7: 1091.

TUMORS of the mandibular joint are rare. They produce symptoms which are often difficult to distinguish from those caused by the more common arthroses. Therefore, the diagnostician must be alert, keeping in mind the occurrence of primary and metastatic tumors in this region.

The author reviews the embryologic development and anatomy of the area and then discusses the following known tumors of the condyle, citing case histories with photographs of roentgenograms and microscopic sections: osteoma (including hypertrophy and exostosis), chondroma, chondrosarcoma, benign giant cell tumor, myxoma, fibro-osteoma (ossifying fibroma), ossifying myxoma, fibrous dysplasia, fibrosarcoma of the joint capsule, and metastatic tumors involving the mandibular joint either by direct extension or metastases.

—*John R. Lindsay, M.D.*

NECK

Congenital Anomalies of the Larynx. PAUL H. HOLINGER, KENNETH C. JOHNSON, and FILMORE SCHILLER. *Ann. Otol. Rhinol.*, 1954, 63: 581.

CONGENITAL LARYNGEAL STRIDOR is a transient form of stridor associated with an abnormal flaccidity of the laryngeal tissues. The stridor is present from birth and usually audible only on inspiration. Laryngoscopy is necessary to establish the diagnosis and rule out other causes of stridor. In the majority of cases, the epiglottis was curled and drawn into the laryngeal aperture with each inspiration. Arytenoids which are long and flaccid are also drawn into the laryngeal lumen. To rule out other causes of noisy respiration, a complete study of infants with stridor is necessary. Frontal and lateral roentgenograms of the neck and chest and fluoroscopic studies of the esophagus are taken, and finally the endoscopic examination is made. Only the direct laryngoscopic view can confirm the diagnosis. As the infant with congenital laryngeal stridor grows, the larynx becomes larger and more firm, and the abnormal folds gradually uncurl. The stridor frequently disappears between the twelfth and eighteenth month. It is extremely rare that any active therapy is indicated.

Nineteen patients with congenital laryngeal webs have been observed. Symptoms of laryngeal webs are present at birth or shortly afterwards, and consist of a

weak cry, or absence of sound with crying efforts. Respiratory distress may occur, depending upon the extent of the web. Three patients were children of school age with speech difficulties. The correct diagnosis can only be made by direct laryngoscopy. It is imperative that preparations for a possible tracheotomy be made before the examination is undertaken if there is respiratory obstruction. Therapy in these patients has been conservative. Two of the infants with membranous glottic webs and one with a supraglottic web have required tracheotomy. In the remaining patients direct laryngoscopic dilatations have been employed, occasionally associated with use of the Knight combination scalpel and dilator.

Congenital atresia of the larynx is obviously incompatible with life unless the condition is recognized at birth and immediate steps are taken to establish an airway.

A case is reported in which the obstetrician noted strong respiratory efforts, with no evidence of air exchange, and quickly performed a tracheotomy. When the child was 10 months old, laryngoscopic examination showed that on lifting the epiglottis, no aperture could be visualized. The epiglottis, hypopharynx, false cords, and arytenoids were seen to be normal. The true cords, however, were joined by a sheet of white fibrous tissue through which their outlines could be distinguished. Efforts to establish a lumen by puncture from above and by retrograde procedures have not been successful. After further growth has taken place, other attempts will be made to open through the obstructing membrane. This infant has other congenital anomalies.

The clinical picture of congenital subglottic stenosis consists of a thickening of subglottic structures and sometimes of the true cords. The point of greatest obstruction is generally 2 to 3 mm. below the level of the superior surface of the true cords. Thirty-four cases have been seen during the past 7-year period. The earliest symptom was stridor with or without episodes of cyanosis. Fourteen of the 34 infants required a tracheotomy. Mild stenosis usually disappears with growth of the larynx. In more severe cases, periodic dilatations are performed. This can be done without fear in patients who have been tracheotomized, but carries some risk if done without a tracheotomy. Two cases are presented.

Five cases of congenital cysts of the larynx have been seen in infants. The cyst presumably arises in one of the laryngeal ventricles and bulges into the glottic lumen. Treatment has been by repeated aspirations, and removal of portions of the cyst with the cup forceps. Two cases required tracheotomy.

Laryngoceles become clinically perceptible only when swollen by air forced into them, or when filled with a collection of fluid; thus laryngoceles and cysts are often indistinguishable from each other. Fifteen cases of laryngocele have been observed. The sacs were unilateral in 11 and bilateral in the remaining 4 cases. In 6 patients the cyst was drained by uncapping the superior surface of the false cord with biopsy forceps. In 5 cases the cyst was removed through an incision along the superior border of the thyroid cartilage. In another case bilateral laryngoceles were removed through an external thyrotomy approach.

—*John R. Lindsay, M.D.*

SURGERY OF THE NERVOUS SYSTEM

BRAIN AND ITS COVERINGS; CRANIAL NERVES

The Behavior of the Blood Leukocytes in Cerebral Concussion and Other Injuries, and Their Relation to the Problem of Vegetative Regulations (Das Verhalten der Blutleukocyten bei Commotio cerebri und anderen Unfaellen als Beitrag zur Frage vegetativer Regulationen). H. Fuss. *Langenbecks Arch. u. Deut. Zschr. Chir.*, 1954, 278: 207.

The author studied the maximal and minimal number of leukocytes following cerebral concussion in 100 cases, and following other types of injuries in another 100 cases. In 50 cases of each group, the author performed an adrenalin test and compared the behavior of the leukocytes with that of the blood sugar. Following cerebral concussion and other injuries as well, the leukocytes behaved in a parallel fashion to the blood sugar following adrenalin tests. No obvious pathologic changes could be found in the leukocytes following concussion or other injuries. The increase of the leukocytes in the adrenalin test was the same following concussion and other injuries. Leukocyte count following adrenalin tests has no more diagnostic value than the blood sugar determinations in cases of cerebral concussion. —*George Perret, M.D.*

Indications for Operation in Closed Head Injuries (Zur Operationsindikation bei gedeckten Schaedelverletzungen). H. Rosolleck and D. Gott. *Chirurg*, 1954, 25: 411.

This study concerns patients with cranial injury admitted to the hospital in an unconscious state who fail to regain consciousness and live from hours to days, finally to die with signs of respiratory and circulatory failure. The possibility that among this group there might be patients with unrecognized extracerebral hemorrhage amenable to surgical treatment was investigated.

The clinical and pathological records of 66 patients who died following craniocerebral injury were reviewed. Of particular interest were 21 patients who died from 2 to 9 days after injury, of whom none regained consciousness. In 3 of this group extracerebral hemorrhage was the cause of death.

In order to determine the frequency of fatal unrecognized extracerebral hemorrhage, the pathological material from 180 cases of fatal head injury was studied. For the purposes of this study only those cases of extracerebral hemorrhage without other proved serious injury were considered. In this group there were 28 cases (15.6 per cent) of fatal extracerebral hemorrhage. The majority of these patients died within 24 hours. The clinical diagnosis was for the most part skull fracture with commotio cerebri.

The difficulties in diagnosis of extracerebral hemorrhage are emphasized. A lucid interval may be lacking and other diagnostic signs may be absent or could result from commotio cerebri or contusion without hemorrhage.

On the basis of their observations and statistics the authors conclude that for patients with head injury who remain unconscious for hours and days, active measures should be undertaken. The most suitable means is the use of diagnostic burr holes at different places on the skull. The next question is the time when this should be done. A general answer cannot be given. This study indicates that a large number of patients with extracerebral hemorrhage die within 24 hours. Therefore on the slightest suspicion of a hematoma during this time one should not wait. The authors' experience has been that patients who do not regain consciousness in 2 days are lost. Therefore, if it is not possible to diagnose bleeding and the patient remains unconscious for 2 to 3 days the risk of opening the skull should be accepted. Granted that in some of these patients no hematoma is to be found a continuation of conservative treatment would not alter the outcome. On the basis of their figures the authors found that 15 of 100 patients had had bleeding. If these patients had been operated upon, with the allowance of a 50 per cent operative mortality, 7 patients might have been saved.

—*John L. Lindquist, M.D.*

Pinealoma with Simmonds' Syndrome; Report of a Case. Hajime Handa, Naoki Kageyama, and Masayoshi Hasegawa. *Arch. jap. chir.*, 1954, 23: 185.

This case report concerns a 17-year-old male in whom lassitude and loss of appetite developed, which was followed by polyuria, dizziness, nervousness, and weight loss over a period of about a year. On hospital admission he was weak and emaciated, the skin was delicate and dry, pubic and axillary hair were scanty. Neurologically there were no abnormalities at first; the blood pressure was 88/60 mm. Hg., and body temperature was normal. The basal metabolic rate was minus 46 per cent. The rate of excretion of 17-ketosteroids in the urine was 6.6 mgm. per day and daily urinary output was 2,000 to 3,000 c.c. The diagnosis was that of an endocrine disorder, presumably Simmonds' disease, and he was given various hormones.

Several months later bilateral visual disturbance appeared and rapidly progressed to blindness in the right eye. Paralysis of upward conjugate movement and some nystagmoid jerks of the eyes on looking to the left were noted. There was no headache or vomiting, no edema of the optic discs, and roentgenograms of the skull showed no abnormality of the sella turcica. The spinal fluid pressure was 220 mm. in the recumbent position. The fluid was otherwise normal. The clinical impression was optochiasmatic arachnoiditis rather than brain tumor.

For the relief of his rapidly diminishing vision, immediate operation was performed but the tumor was not found. The optic nerves were found to be surrounded by tortuous, dilated veins, and abnormalities in the shape and course of the cerebral meningeal artery and its branches were found. The wound was closed. Visual acuity did not improve and the patient's condition gradually deteriorated, death occurring several months later.

Postmortem examination revealed a large, soft tumor about the size of a hen's egg extending from the pineal body to the hypothalamus. The pineal portion of the tumor, which was presumably the primary tumor, was small, whereas the implantation metastasis in the hypothalamus was extensive. Metastatic tumor cells also invaded the posterior part of the hypophysis. The microscopic structure was characteristic of a pinealoma. The tumor cells in the infundibulum as well as in the intermediate part of the hypophysis were exclusively lymphoid cells diffusely distributed.

As for the Simmonds' syndrome, it is to be noted that the greater destruction was found in the stalk and posterior portion of the pituitary rather than in the anterior portion. Because the destruction was most pronounced in the hypothalamus the syndrome in this case is considered to be of hypothalamic rather than of anterior pituitary origin.

—John L. Lindquist, M.D.

SYMPATHETIC NERVES

The Veins After Sympathectomy. PETER BEACONSFIELD. *Surgery*, 1954, 36: 771.

SYMPATHECTOMY is often done with the thought of effecting a change in the arterial system alone, and blood flow through a sympathectomized limb is usually discussed in terms of arterial flow. The author raises the question as to whether veins behave passively, merely dilating as a result of the increased blood flow through the affected part, or whether they are in fact capable of independent vasodilation, irrespective of whether the blood flow is increased or not.

Sympathectomy may be done primarily for the improvement of the venous system alone, and this is rational since the innervation of the veins is the same as that of the arteries. In fact, some investigators claim that they are more sensitive to stimuli than the arteries.

By combined volumetric temperature and infrared photographic studies, the author has determined that veins do indeed dilate after sympathectomy, but that the vasomotor tone begins to return to preoperative levels shortly after sympathectomy, not reaching this level for at least 12 months—a considerably longer period of time than is the case with the arteries in the same limb. He believes that the dilatation of veins after sympathectomy is not merely due to increased blood flow because of the arterial dilatation, but it is in fact an active process since it is still present even after the blood flow has returned to the preoperative rate. He suggests that the discrepancy which exists after sympathectomy between blood flow and skin temperature in the denervated area (skin temperature after sympathectomy remains considerably higher than the preoperative level for an indefinite time, contrary to the blood flow, which returns to almost the preoperative level a few weeks after sympathectomy) is perhaps in part the result of the decreased venous tone after sympathectomy. The veins, having less smooth muscle than the arteries, may not recover their vasomotor tone as readily as arteries after sympathectomy, thus allowing a larger quantity of blood to be present in the limb after the operation without there actually being an increase in blood flow per unit of time.

—John Martin, M.D.

MISCELLANEOUS

Major Vascular Complications of Intervertebral Disc Surgery. SAMUEL P. HARBISON. *Ann. Surg.*, 1954, 140: 342.

THIS TIMELY REPORT on a series of major blood vessel injuries following lumbar intervertebral disc surgery should be read and soberly pondered by the growing number of surgeons who undertake the responsibility of operating upon defective discs. As Eldridge Campbell states in the published discussion of the report (quoting Arthur Allen), "It's the fat hog that needs to worry." It can happen, apparently, even in the hands of the most competent surgeon.

Harbison collected data on 31 patients who were known to have suffered abdominal injury through instrumentation beyond the anterior longitudinal ligament. One patient suffered injury to the small bowel; the other 30 suffered rents in the great vessels, most commonly the iliac vessels. The guilty instrument was most often the biting rongeur, usually of the type known as "pituitary rongeur." Most of the laminectomies were for discs at the L 4–5 level, and the common iliac artery and/or vein were most frequently injured; but injury occurred with discs as high as L2 and L3, and as low as the L5–S1 interspace.

Three-fifths of the patients died following the surgical accident. Unless excessive hemorrhage occurred during operation, the true cause of postoperative shock was not usually determined until too late. Typically, there is *not* a tell-tale hemorrhage through the opened interspace at the time the vessel is torn, since bleeding occurs, rather, into the abdomen. The author warns, therefore, that a palpable abdominal tumor, with or without bruit, abdominal pain, nausea, and the shocklike state must always raise a suspicion postoperatively that a great vessel has been injured. Those patients fortunate enough to develop within a few days a tell-tale fistula, with bruit, edema of the lower extremities, and the attendant heart signs, can usually be saved by prompt surgery. It is stressed that the patient should be so placed on the operating table during surgery upon the injured disc that the great vessels of the abdomen will not be distended, and so that they and the bowel may be slack against the posterior-lying longitudinal and annular ligaments.

—John Martin, M.D.

SURGERY OF THE THORAX

CHEST WALL AND BREAST

Report on 124 Cases of Carcinoma of the Mammary Gland (Bericht ueber 124 Faelle von Mammakarzinom). F. ROTH. *Geburtsh. & Frauenh.*, 1954, 14: 773.

THE AUTHOR, of the Gynecological Department of the University of Berne, Switzerland, discusses a series of 124 cases of breast carcinoma observed at this hospital during a 20 year period (1926 through 1946). The cases are analyzed and tabulated according to age, hormonal stage (before or after the menopause), duration of the presence of the tumor before medical advice was sought, stage of the tumor at the time treatment was started, methods of therapy, 5 year survival rate, incidence of late metastases or recidivation, and histologic character of the tumors.

The tumor occurred before the menopause in 42.8 per cent, and after the menopause in 57.2 per cent of the cases.

In contrast to the belief of many writers, the author does not believe that follicular hormone plays a noticeable role in the pathogenesis of breast cancer. He supports this statement by a number of observations: (1) the growth of breast carcinoma in elderly women is inhibited not only by androgen but just as much by estrogen injections; (2) the incidence of breast cancer in his patients was highest during the first 5 years after the menopause, i.e., during the period when the production of follicular hormone is markedly diminished or stopped altogether; (3) in none of the 124 patients was there any evidence of hyperfolliculinism; (4) the proportion of permanent cures was higher in the women before, than in those after the menopause. Many patients in the younger age group continued menstruating regularly after treatment was terminated. Although these patients were under continuous influence of follicular hormone, their expectation for permanent cure was much higher than in the older age group.

Of the different types of carcinoma, the solidum simplex was the most frequent (47.6 per cent); scirrhous carcinoma was next most frequent, with 21 per cent. In contrast to statistics by other authors, the scirrhous carcinoma had the best prognosis as to permanent cure. —*Werner M. Solmitz, M.D.*

Bilateral Adrenalectomy for Advanced Carcinoma of the Breast with Preliminary Observations on the Effect of the Liver on the Metabolism of Adrenal Cortical Steroids. MAURICE GALANTE, J. MAX RUKES, PETER H. FORSHAM, DAVID A. WOOD, and H. GLENN BELL. *Ann. Surg.*, 1954, 140: 502.

A CASE SURVEY of 31 patients with bilateral adrenalectomy and oophorectomy is presented. There was no correlation between clinical improvement and histology of the primary lesions or weight of the adrenal glands.

The authors describe an experimental procedure in one case of shunting blood from the left adrenal gland into the portal circulation following right adrenalectomy and bilateral oophorectomy. This procedure was used in one case and the patient has done well without substitution therapy.

The authors report an objective improvement in 22 per cent and a subjective benefit in 45 per cent of their patients who had failed to respond to established methods of therapy.—*W. Foster Montgomery, M.D.*

Rationale of Internal Mammary Lymph Node Dissection for Carcinoma of the Breast. DONALD M. GLOVER. *Arch. Surg.*, 1954, 69: 393.

INTERNAL MAMMARY NODE dissection is useful primarily as a diagnostic and prognostic index preliminary to radical mastectomy for central and medial quadrant carcinomas. A simple technique is described which may be carried out as an adjunct to radical mastectomy without significantly increasing the operative hazard. It seems probable that most cases of breast carcinoma demonstrating involved internal mammary lymph nodes should be considered inoperable. It seems unlikely that either block resection or local excision of the nodes will be curative if these nodes contain tumor. —*John J. Maloney, M.D.*

TRACHEA, LUNGS, AND PLEURA

Intrathoracic So-Called Endotheliomas (Die intrathorakalen sog. Endotheliome). R. H. JENNY and O. ULSPERGER. *Langenbecks Arch. u. Deut. Zschr. Chir.*, 1954, 278: 376.

A SERIES of 16 patients (9 men and 7 women) with malignant endotheliomas or hemangioendotheliomas is reported by the authors. In 11 patients the tumor originated in the pleura, and in 5 patients intrapulmonary neoplasms were found. Neither conservative nor surgical procedures were able to exert any influence on the progressive course of the disease. Both types belong to the group of the most malignant tumors.

Correct preoperative diagnosis can be made only in exceedingly rare cases and even the interpretation of pathologicohistologic findings presents great difficulties. While some pathologists deny the existence of endotheliomas and maintain that malignant tumors of the pleura represent metastases of carcinoma of other organs, according to others the term encompasses a variety of histologic pictures and includes formations originating either in the endothelium of lymphatic channels or in the lining of serous membranes. The type called "fibrous mesothelioma," which is applied to circumscribed, rather benign tumors, was never encountered by the authors.

They stress the discrepancy between the relatively satisfactory general condition of the patients at the time of admission, and the clinically and roentgenologically far advanced local process. Hemoptysis was rare, even in the presence of intrapulmonary tumors or those originating in the pleura and invading the lung parenchyma.

The authors do not deny the possibility that the intrapulmonary tumors originated in the visceral pleura but they emphasize the fact that the growths were expanding within the lung, in contradistinction to neoplasms of pleural origin which usually are more flat and spread along the surface of the lung.

—Joseph K. Narat, M.D.

Inflammatory Changes Associated with Primary Bronchogenic Carcinoma; Clinical and Pathological Studies. ERKKI LAUSTELA. *Ann. chir. gyn. fenn.*, 1954 supp. 2.

THIS EXTENSIVE STUDY, published as a supplement to the journal, deals with 100 consecutive cases of bronchogenic carcinoma in which resection was carried out at the University of Helsinki in the years of 1950 to 1952. The author discusses the frequency of bronchial, parenchymal, and pleural inflammations, their nature, how they develop, and how they influence the clinical picture and operative mortality. Further consideration is given to the frequency of central necrosis and cavitation in carcinomas (59 cases), and the coexistence of tuberculosis in carcinomatous lungs (7 cases).

There are detailed presentations of the problems of bronchial obstruction with the infectious complications of bronchitis, bronchiectasis, and pneumonia, and of the noninfectious sequela of obstruction, emphysema, atelectasis, and fibrosis. Abscess, gangrene, and cavitation are considered separately.

In the clinical correlation, it was noted that three-fourths of the patients had fever, the severity of which was parallel with the inflammatory changes—not with tumor necrosis. A similar parallelism was noted with the tendency to leukocytosis. On the other hand, the elevated sedimentation rate noted in 91 per cent of the cases seemed not to be a function of inflammation.

—Leonard D. Rosenman, M.D.

Evaluation of the Operative Risk in Pulmonectomy; Further Experiences with the Test of Bronchial Blockade and the Intraoperative Two-Stage Blockade of the Main Bronchus and the Pulmonary Artery (Zur Beurteilung des Operationsrisikos bei Pneumonektomie; Weitere Erfahrungen mit dem Bronchusblockadetest und der intraoperativen zweistufigen Blockade von Hauptbronchus und Arteria pulmonalis). M. WENZL and E. STRAHBERGER. *Langenbecks Arch. u. Deut. Zschr. Chir.*, 1954, 278: 388.

Cardiopulmonary interrelations after pulmonectomy can be imitated by the application of Maurath's blocking instrument to the main bronchus of the diseased lung and concurrent determination of arterial oxygen saturation with Brinkman's reflection oxymeter. This test of bronchial blockade was applied by the authors in 100 elderly patients with bronchial carcinoma.

The routinely employed, so called "combined, two-stage intraoperative blockade of the main bronchus and the pulmonary artery" furnishes valuable information because a return of the degree of oxygen saturation close to the original level may be considered a favorable prognostic sign. Pulmonectomy can also be performed if, after blockade of the main bronchus, the oxygen saturation remains on a constant, lower level which does not change after additional arterial blockade; however, in such cases intensified tracheobronchial secretion, cyanosis, and a pre-edematous condition may be expected. The prognosis is unfavorable if after arterial blockade a progressive fall of the oxygen saturation is recorded.

Determination of arterial oxygen saturation after blockade of the involved lung demonstrated functional accommodation of the controlateral lung in 55 per cent of the authors' series. In cases in which the test of bronchial blockade failed to demonstrate such adaptation of the normal lung, the two-stage blockade of the main bronchus and the pulmonary artery was employed to appraise the adaptability of the cardiorespiratory system.

—Joseph K. Narat, M.D.

HEART AND PERICARDIUM

Safe Conduct of the Patient Through Cardiac Surgery; with Special Reference to Diseases of the Mitral and Aortic Valves. H. BLACK and D. E. HARKEN. *N. England J. M.*, 1954, 251: 45, 85.

AFTER DECADES of sporadic though brilliant attempts at cardiac surgery, intense activity in this field in the past 8 years has resulted in many new surgical accomplishments. The principles presented are based on extensive experience with patients undergoing cardiac surgery during the past 7 years.

Valvuloplasty for the correction of mitral stenosis has been the most common procedure. It should be emphasized that this must be a team project shared by the surgeon with the cardiologist and anesthesiologist, each of whom will be called on to make important contributions. In the immediate preoperative period, over-digitalization has been far more common than insufficient dosage, particularly when one of the refined and potent forms of digitalis (predominantly digitoxin) has been employed, for with these agents the warning symptoms of gastrointestinal disturbance that characterize digitalis-leaf toxicity may be absent. In their place, direct myocardial toxicity is the first evidence of overdosage; this is manifested by ventricular extrasystoles, impaired atrioventricular conduction, or alterations in the pacemaker. These warnings of myocardial irritability must be heeded if the surgeon wishes to avoid dangerous arrhythmia at the time of operation. In addition, since hypokalemia potentiates the toxic properties of digitalis, the administration of potassium chloride in doses of approximately 3.0 gm. a day is indicated in this situation even though the serum level is within normal limits. All patients who are to undergo a valvuloplasty are digitalized, even though it has not previously been required and normal sinus rhythm is present. The routine prophylactic use of quinidine or procaine before or during operation is contraindicated because of the undesirability of depressing the myocardium. Hearts depressed by such drugs go into arrest more frequently.

There are two fundamental types of electrolyte pattern before the operation in the cardiac patient. The majority of patients studied have normal or high stores of sodium. In addition the total body water is almost invariably increased. A few patients—generally those who have been in severe congestive heart failure

requiring prolonged sodium restriction and vigorous mercurial diuresis—constitute the other group manifesting an actual depletion of sodium stores. The preoperative finding of hyponatremia is a particularly ominous sign. A few such patients have been brought to and through the successful correction of their valvular lesions. The management of this electrolyte problem consists of continued salt restriction, limitation of fluid to from 1,000 to 1,500 c.c. a day to avoid serum dilution, and daily weighing of the patient. The urinary sodium concentration should also be measured. If it is elevated to more than 30 milliequivalents per liter there is an unregulated salt loss through the kidneys; however, if the urinary sodium is below 25 milliequivalents per liter, with a low serum sodium, the conservation by the renal tubules may be considered normal. In most of the patients showing preoperative hyponatremia, attempts to correct the situation by oral or intravenous infusion of saline solution have been futile. Ideally, the total exchangeable sodium should be measured to elucidate these problems, but this is rarely possible in practice. However, some general rules can be applied. Thus, if the patient with hyponatremia has not responded preoperatively to the regimen discussed, a single test dose of 250 c.c. of 3 per cent sodium chloride should be given. The body weight and serum sodium concentration are followed closely for 72 hours. If the concentration rises and the patient does not gain weight or form new edema, a true sodium deficiency may have been present. Under such circumstances a few days of oral sodium supplementation with continued fluid restriction may produce further improvement. Any repetition of such an intravenous dose preoperatively, however, is dangerous. It is preferable to delay operation until the serum sodium level reaches 130 milliequivalents per liter or more. The administration of cortisone in this situation has not been found effective. The judicious use of diuresis is of utmost importance. The patient should be brought down to a minimum weight. Even patients with no obvious edema are given a dose of 1 c.c. of mercuhydrin early in the preoperative period. If the patient has a marked response to the first dose of the mercurial diuretic it should be repeated at intervals of 48 to 72 hours until the "optimal dry weight" has been reached. It may be that elastic stockings will augment mercurial diuresis. Furthermore, such stockings are routinely used to prevent stagnation in the deep venous system. In patients who have definite enlargement of the liver, operation has been delayed for at least a week or 10 days for rest and preparation. The liver profile is obtained and the patients are placed on a high carbohydrate, low fat diet, with vitamin B supplements in addition to choline, methionine, inositol, and folic acid. This period of preparation has reduced the liver complications in the postoperative period. Forty-eight hours before operation the parenteral injection of penicillin is begun. This is supplemented by aerosol penicillin and streptomycin in patients with mitral stenosis in whom chronic pulmonary suppuration is present.

The optimal balance between oxygen transport and blood viscosity is found when the hematocrit is below 80 per cent for infants, 70 per cent for children, and 60 per cent for young adults. Phlebotomy may be done if the hematocrit exceeds these values. In general, whenever there is evidence of significant valvular obstruction, its relief is indicated despite the suspicion of active rheumatic carditis. Sedimentation rates, antistreptolysin titers, and low grade febrile courses have all proved to be unreliable indexes of rheumatic activity. Dramatic improvement almost invariably follows the relief of significant mitral stenosis even in cases in which the evidence is very suggestive of active carditis. In more than 700 cardiac operations on patients with rheumatic heart disease there have been only 3 overt cases of reactivation of rheumatic carditis in the immediate postoperative period. A significant number of patients with subacute bacterial endocarditis have undergone successful, uncomplicated valvuloplasty within several weeks of control of the blood stream infection. Although operation would not knowingly be undertaken in the face of such an infection the mere existence of a low grade fever preoperatively should not delay surgical correction in the patient obviously needing it.

The general mental attitude of patients facing a cardiac operation cannot be overemphasized. They should approach the procedure with confidence and expectation of success. This attitude is best obtained with kindness and warmth on the part of the physicians and nurses in attendance. In addition, the patient's apprehensions are often allayed if he talks with others who are convalescing from a successful operation. It is vital that a minimum of anesthetic agent be used; there has been ample evidence that cardiac arrest in diastole results when more than minimal amounts are given. Pentothal (100 to 200 mgm.) is given intravenously, followed by nitrous oxide, oxygen, and ether, with curare for intubation. Cyclopropane has been discontinued because of its tendency to increase cardiac irritability. Ventilation can be achieved most reliably by the use of a mechanical assistor. The sponge-weight method for the determination of blood loss has demonstrated its value, but it was found that the measured loss was usually exceeded by at least about 500 c.c. The major problems of the intraoperative phase are cardiac irritability, ventricular fibrillation, and cardiac arrest. Safety lies in prevention rather than treatment. The use of local anesthetics on the intercostal nerves before the ribs are spread helps prevent neurogenic cardiac irregularities. Hypotension is corrected by the control of tachycardia, with vasoconstrictors, and by blood replacement, intravenously or intra-arterially. Much cardiac irritability can be corrected preoperatively by the regulation of the digitalis dosage. If irritability does not disappear spontaneously, from 75 to 100 mgm. of procaine amide (pronestyl) may be given intravenously. Additional doses may be given after an interval of 5 to 10 minutes. When ventricular tachycardia becomes ventricular fibrillation, some method of bringing the heart into standstill and then initiating a co-ordinated beat is necessary. Successful efforts have followed the intracardiac injection of procaine (10 c.c. of 1 % solution) or potassium chloride (10 milliequivalents in 10 c.c.) to produce standstill. This is followed by vigorous manual systole to maintain the circulation until an adequate heart beat is restored. Calcium chloride (10 c.c. of a 10% solution) has proved to be the most

reliable agent for reviving the arrested heart. Compression of the descending aorta helps to maintain the vital cardiac and cerebral circulation.

Electric defibrillation is employed only when the simple measures described have failed, since not a single case has survived defibrillation by this means. Fewer than 1 or 2 per cent of human hearts that have gone into persistent ventricular fibrillation have been satisfactorily defibrillated with ultimate survival of the patient. Uncomplicated cardiac arrest is a different and simpler problem. Simple measures are generally effective. The anesthetic agent is immediately washed out by hyperventilation with 100 per cent oxygen, and gentle intermittent cardiac compression is instituted. This alone frequently restores the beat. If actual arrest persists, 6 to 10 c.c. of 10 per cent calcium chloride is injected directly into the left ventricle and stroked into the coronary circulation. This may be repeated, or 1.0 c.c. of epinephrine (1 to 1,000 solution) diluted with 10 c.c. of saline solution may be used similarly. With this routine, resuscitation and survival are the rule.

If cardiac arrest occurs when the chest is closed or in patients not under anesthesia one must consider an acute coronary occlusion, a pulmonary embolus, and vagal arrest as etiologic agents. The electrocardiogram is useful in determining the actual state. Stimulation of the heart through the intact chest wall with a needle will revive the spontaneous beating of many hearts suffering from vagal arrest. Calcium chloride and epinephrine solutions may be injected in the appropriate dilution. If the arrest is not corrected by these simple measures and overdosage of an anesthetic or drug can be definitely incriminated, the chest and pericardium must be opened and manual systole instituted. A great deal of harm may be done by the indiscriminate use of open thoracotomy and manual systole. In valvular surgery on the left side of the heart one of the most important sources of morbidity and mortality is embolization. Flushing of the atrium before the finger is inserted and the introduction of a large bore suction tip within the chamber will remove many friable clots from the blood stream. In addition, the circulation to the brain is interrupted in all patients with mitral stenosis who are over the age of 35 and who are fibrillating or who have demonstrable calcium in their valves. This flushing and suction are also carried out in all operations for aortic stenosis. To this end, rubber dam drains are passed about the right innominate, left common carotid, and left subclavian vessels. During the dangerous portions of the intracardiac maneuver the circulation to the brain is interrupted by kinking of these vessels at their origins. The period of occlusion should be limited to 1 minute. It appears unlikely that embolism during surgery will ever be entirely eliminated in patients with clotted atria and calcified valves.

Postoperatively, the patient is maintained in Fowler's position regardless of the presence or absence of detectable peripheral blood pressure. Oxygen should be administered by means of the nasal catheter for the first 24 hours. It may then be discontinued if its omission does not result in an elevated pulse or respiratory rate, or both. In many of the poor risk patients it is best to continue oxygen for 4 or 5 days. Oxygen masks are not used because of the discomfort to the patient and the impracticability of keeping them in proper functioning position. Oxygen tents have also been abandoned because of the well known difficulty of maintaining a satisfactory concentration of oxygen.

At the end of the operation 1,000,000 units of penicillin and 1 gm. of streptomycin are placed in the pleural space. Procaine penicillin G is given by the intramuscular route for 7 to 10 days. Elastic stockings are applied postoperatively on all patients to reduce venous stasis and thus the danger of pulmonary emboli. Postoperative pain from trauma to the intercostal nerves can be reduced by crushing two nerves above and two below the incision at the time of operation. Morphine is administered in sufficient dosage to allow the patient to cough comfortably, but depressive amounts are avoided. The patient with pulmonary vascular congestion secondary to heart disease has an even greater tendency to atelectasis than the average patient after a thoracic operation. Frequent coughing or nasotracheal suction or bronchoscopy may be necessary.

Early ambulation should be practiced except when the patient's age, cardiac status, or general condition is a contraindication. After a cardiotomy in the left ventricle the patient is kept at bed rest for 2 weeks and treated as though he had had a myocardial infarction. Within a few days of operation, breathing exercises and arm raising are practiced. Hypotension may be a problem immediately after the operation. Too often, drainage of blood from the chest tube is overlooked; determination of its hematocrit serves as a guide to replacement. In addition, it may be necessary to administer norepinephrine. This agent should not be injected into a limb that has had a previous arterial infusion as skin slough from arterial spasm may occur. Damaging peripheral constriction may occur, however, even in the absence of a previous arterial cutdown. If administration results in blanching and coldness of the extremity the use of another extremity or a change to neosynephrine (given intramuscularly) is indicated.

In some patients, despite the most careful tracheal suction, high fever may occur, and in such cases aspirin by mouth, rectum, or vein is indicated to eliminate the tachycardia of hyperthermia, which may impose an undesired burden on the myocardium. Nicotinic acid in an infusion may help produce a cooling vasodilatation. Dehydration must also be considered as a possible cause of this condition. Experience with hyperpyrexia resulting from other lesions of the central nervous system suggests that the administration of compound F or cortisone may be effective in reducing the temperature. The previously determined maintenance dosage of digitalis must be given during the morning of operation and continued without interruption. Parenteral administration is employed whenever there is any question of intestinal absorption. In a significant number of patients rapid fibrillation will develop either during operation or shortly thereafter. This necessitates the supplementation of the maintenance dose of digitalis with short-acting preparations such as digoxin (0.25 to 0.5 mgm.) given orally or intravenously, or cedilanid (0.2 to 0.4 mgm.) given intravenously, or ouabain (0.1 to 0.2 mg.) given

intravenously. If the apical rate remains above 120 these agents are administered every 2 or 3 hours until slowing occurs. Prostigmine temporarily controls the rate. In cases with an uncontrolled rate in which the situation is unclear the use of the ultrashort-acting acetyl strophanthidin under careful electrocardiographic control may be helpful. From 0.2 to 0.4 mgm. of this agent are given intravenously, and the electrocardiogram is followed up. Slowing of the cardiac rate is a clear indication for the supplementation of digitalis, but if evidence of myocardial toxicity is seen further digitalis is withheld. The usefulness of this agent lies in the fact that its effect is generally dissipated within half an hour. It is a dangerous drug, however, and must be used with great caution. A similar diagnostic test can be performed with digoxin, cedilanid, or ouabain.

To all patients with mitral stenosis and regular rhythm and to all who have undergone a transventricular cardiotomy, quinidine (0.2 gm. every 4 hours) is given prophylactically after the operation. Heparin is administered, after operations for mitral stenosis, to patients with heavily calcified leaflets after the correction of aortic stenosis, and when pulmonary embolization occurs postoperatively. Cerebral emboli have been reduced by obstruction of the circulation to the brain during the hazardous portions of valvuloplasty. Problems of water and electrolyte imbalance are second only to cerebral embolization as sources of morbidity and mortality after operations on the mitral valve. There is frequently a marked fall in the serum sodium by the second postoperative day. After cardiac surgery all patients have been restricted to 1,500 c.c. of fluid per 24 hours until the usual spontaneous diuresis occurs on the third or fourth postoperative day. Indications for the intravenous administration of 3.0 per cent sodium chloride are a dangerously high serum potassium, hyponatremia beyond the fourth or fifth day, or an acute depression of the plasma sodium to 120 milliequivalents per liter or below within 48 hours of operation with associated symptoms. In intractable hypotension due to adrenal failure compound F given intravenously may prove life-saving. Quinidine prophylaxis is maintained for 6 weeks to 2 months in all patients who were in normal rhythm before operation. All patients with rheumatic valvular disease receive oral penicillin prophylaxis after operation for prolonged periods. Good technical surgery is only an incident. Good medical care before the procedure and for long periods, even years, afterward, is of vital importance.—*Maurice J. Small, M.D.*

MISCELLANEOUS

Diaphragmatic Retrocostoxyphoid Hernias (Les hernies diaphragmatiques rétro-costo-xiphoïdiennes). ROGER ÉVEN, CHRISTIAN SORS, and RENÉ CODIS. *Presse méd.*, 1954, 62: 1302.

THIS STUDY is based on 48 clinical cases of diaphragmatic retrocostoxyphoid hernia collected from the French literature, among which were 4 personal cases. Twelve additional cases were observed at autopsy and 2 of these were strangulated.

Retrocostoxyphoid hernias represent 3 to 5 per cent of all diaphragmatic hernias. This herniation occurs through Larrey's space or in its immediate neighborhood, and in spontaneous cases occurs almost always to the right. It occurs in all ages and more frequently in males.

These hernias are simple or mixed (gastrointestinal, epiplointestinal, or others). They may or may not be associated with clinical disturbances, which may be digestive, respiratory, or both. Roentgenologically they are revealed by an opaque or radiolucent (or mixed) shadow in the hemithorax, located anteroinferiorly and varying with time. Usually, if they are not latent, they give rise to clinical and roentgenologic signs: gastric and intestinal types produce digestive disturbances and radiolucencies, epiploic and hepatic types give respiratory signs and opacification, and mixed forms result in mixed clinical signs and symptoms. Roentgenologic differentiations from pleuropericardial cysts and diaphragmatic deformations are easy after pneumoperitoneum is produced and barium is introduced into the colon and stomach.

Except for the hepatic types, surgical cures can be obtained even in the epiploic types which strangulate easily or may mask a gastrointestinal type.

—*Jonas Brachfeld, M.D.*

SURGERY OF THE ABDOMEN

GASTROINTESTINAL TRACT

Massive Gastrointestinal Bleeding; Study of 296 Patients at City Hospital of Cleveland. M. Atik and F. A. Simeone. *Arch. Surg.*, 1954, 69: 355.

The presence of massive hemorrhage was determined by the following criteria:

1. Clinical evidence of hemorrhagic shock
2. Syncope related to hematemesis or melena of more than 1 liter (estimated).
3. Continued blood loss during the period of 1 week, at no time sufficient to cause syncope or shock, but enough to cause a hematocrit reading below 25 per cent and a hemoglobin concentration below 8 gm. per 100 c.c.

On the basis of these criteria, 296 of 442 patients were classified as having had massive gastrointestinal bleeding. Twenty per cent of these patients had red cell counts of between 3 and 5.1 million, and hemoglobin concentrations of between 10 and 17 gm. They were, nevertheless, considered to have had massive hemorrhage by the criteria described.

Of the 296 cases studied, 138 were secondary to benign ulcer of the duodenum or stomach, and 68 were secondary to esophageal varices. There was a preponderance of men over women of 3.5 to 1 and of whites over negroes of 5 to 1.

Only 50 patients were operated on, with a mortality of 24 per cent. The mortality among those treated without operation was 43 per cent. Thirty-eight deaths among the latter occurred during the first 48 hours after admission. The surgical mortality among the patients operated on within 3 days after admission was 2 of 9; the treatment in these 2 patients consisted only of the injection of the esophageal varices with sclerosing solution.

There is no advantage in delaying operation once the indications are clear and proper preoperative preparations have been made. Death was attributed to hemorrhagic shock in 99 of the 118 patients who died.

In this small group of surgically treated patients, there was no significant difference between the mortality rate of the group who were less than 50 years of age and that of those more than 50 years of age. The data suggest that postponement of operation is a more important factor than age alone in affecting the surgical mortality. —*Samuel Kahn, M.D.*

Regenerative Power of the Gastric and Duodenal Mucosa (Die Regenerationskraft der Magen-Duodenalschleimhaut). Victor Hoffmann. *Langenbecks Arch. u. Deut. Zschr. Chir.*, 1954, 278: 409.

Experimental data are cited on the specificity of regeneration and differentiation into mature mucosal elements following the experimental production of gastric and duodenal ulcer. Despite much experimental work to the contrary, the author states that, in practice, healing with complete restorative regeneration has never been proved. The so-called "healed ulcer" actually does not exist, in the sense that perfectly normal mucosa is never restored. Deep ulcers heal by contraction of scar and rolling of the edges; single-layer or flattened-layer epithelium overgrows the more shallow ulcers. Since blood supply comes essentially from the serosal side, the mucosa is the first portion of the mural structures to erode, and the last to be revascularized. Muscularis is replaced only by scar tissue, not by regeneration of muscle.

—*Harold Laufman, M.D.*

Acute Hemorrhage in Peptic Ulcer. C. Holten and Ingeborg Nielsen. *Acta med. scand.*, 1954, 150: 139.

The case material of massive hemorrhage from gastric and duodenal ulcer for the years from 1938 to 1950 is presented. It comprises 397 individuals, with 502 acute hemorrhagic episodes.

Severe anemia could be found in cases of hemorrhage of short duration, although the average duration in the cases in which anemia of 40 per cent or less developed was 18.7 days, against the over-all average of 14.7 days.

Ninety-two of 364 patients in whom x-ray examination was undertaken at the time of bleeding presented no signs of ulcer. The over-all mortality in bleeding from an ulcer was 6.8 per cent. The relative frequency of duodenal to gastric ulcer was 3.1, although no significant difference between the mortality from bleeding gastric or duodenal ulcer could be found.

The principles of treatment are outlined, and the indications for and against operation are discussed. The importance of the age factor is stressed, there being an increasing mortality with increase in age.

The occurrence in this material of 2 cases with acute bleeding in which cerebral lesions were found, is recorded. One case was apparently due to a hypophysial tumor making an impression on the floor of the third ventricle; in the other case diffuse atrophy of the brain was present, ependymitis granularis being present simultaneously at the posterior part of the left hypothalamus. —*Ely Elliott Lazarus, M.D.*

Severe Hemorrhage in Presumed Peptic Ulcer; Surgical Treatment in the Absence of a Demonstrable Lesion. R. K. Gilchrist and Newton Chun. *Arch. Surg.*, 1954, 69: 366.

Of 140 patients with peptic ulcer, in whom gastric resection was done, 11 were operated upon for severe hemorrhage. In 5 of these 11 patients, no source of bleeding was found at exploration. These 5 cases are reported.

The possibility of high cardiac lesions must be entertained in cases of unexplainable gastric hemorrhage. In 3 fatal cases there were bleeding areas in the gastric mucosa, 3.5 to 7 cm. from the esophagus. The necessity of ruling out such lesions is evident. The anatomic basis for the profuse bleeding in superficial ulcers and erosions is found in the extensions of these lesions into the intensely vascular submucosal and mucosal plexuses.

The definition of massive bleeding and the necessity for surgical intervention are shock, syncope, and rate of blood loss requiring more than 1.5 liters' replacement in 24 hours, a fall in the red cell count to 2,500,000 or less, and a reduction to 60 per cent or less in circulating red cell volume. Such patients should have rapid transfusions with whole blood to abolish shock, and to return the blood values to normal before surgical intervention. However, if bleeding recurs, or if there is failure to stabilize with transfusions, immediate exploration is indicated. Early exploration is imperative in patients who are over 45 years of age.

Exploration in cases of peptic ulcer with massive bleeding usually discloses the bleeding site. On exploration for a source of bleeding which is not evident, the clots are removed from the distended stomach through a gastrotomy incision, extending to within 7 cm. of the esophagus. Careful search of the accessible mucosa should be made. If no bleeding source is found, the entire stomach is mobilized by freeing both curvatures and ligating all vessels, permitting a downward displacement of the fundus. This allows visualization and palpation of the entire mucosal surface. With failure to demonstrate a definite bleeding source, a 75 to 80 per cent resection is done. If peptic erosions are present, an infradiaphragmatic vagotomy is performed at the same time.

Should massive hemorrhage occur after resection, reoperation is advisable. At this time, the remaining stomach is resected except for a narrow 1.5 cm. cuff, the mucosa of which can be easily visualized. In one known case, such reoperation and resection resulted in cessation of bleeding, in spite of the lack of any demonstrable bleeding lesion in the segment of stomach resected at the second operation.

—Samuel Kahn, M.D.

The Billroth II Resection for Gastric and Duodenal Ulcer; Immediate and Late Results. LARS TROELL. *Acta chir. scand.*, 1954, 108: 25.

THE AUTHOR reviews his personal series of 749 patients with gastric or duodenal ulcers treated during the period from 1940 through 1949 in the Karolinska Institute, Stockholm. There were 599 males and 150 females, the majority of them being 25 to 50 years of age. Five hundred and forty-nine had duodenal ulcer, 159 had gastric ulcer, and the remainder had duodenal and gastric ulcers (13), stoma ulcers (27), and gastritis (1). In 84 per cent the duration of symptoms was at least 3 years at the time of operation; only in 5 per cent was it 1 year or less. Approximately half the patients had undergone prior medical cures; 83 had surgery because of penetration, stenosis, repeated hemorrhages, failure to heal under medical therapy, or at the request of the patients themselves. With the Billroth II procedure the mortality was 2.4 per cent; about one-third of the deaths were due to leakage of the duodenal stump.

The occurrence of postoperative retention was investigated in 627 patients who had undergone resection with retrocolic gastroenterostomy. The incidence, both mild or severe, amounted to about 40 per cent, but only in 9 cases was it of such nature as to require secondary operation. Follow-up studies (3 to 12 years) revealed that the incidence of severe and relatively severe postprandial symptoms following resection was 15 per cent in male patients and 22 per cent in females. In this respect there was no difference between gastric and duodenal ulcers in males, but in females the incidence was twice as high in duodenal as in gastric ulcer. There was no demonstrable correlation between the extent of the gastroenterostomy and the incidence of postprandial symptoms. Each of the eight stomal ulcers in this series occurred in males after resection for duodenal ulcer. On the basis of these results the author suggests that at least 2, preferably 3, medical cures without definite healing should be required as an indication for operation in uncomplicated chronic ulcers. It is preferable to avoid operation in allergic patients and in patients with preoperative postprandial symptoms—especially if they are females.

Troell summarizes his results of the Billroth II operation per 100 patients, as follows: there were 3 deaths in connection with the operation; 2 deaths occurred later as a result of other diseases; 4 patients cannot be traced at follow-up; 1 patient has recurrence of ulcer; 3 patients have severe postprandial symptoms and reduced working capacity; and 87 patients are improved. *—Edwin J. Pulaski, M.D.*

Fatal Late Complications of Ulcer Surgery (Die toedlichen Spaetkomplikationen in der Ulcuschirurgie). R. KUEHLMAYER. *Langenbecks Arch. u. Deut. Zschr. Chir.*, 1954, 278: 477.

Although the so-called technical mortality from gastric resection is 1.5 per cent in the author's series, the late mortality is 5.2 per cent for patients on whom a Billroth I operation was done, and 6.9 per cent for those who were subjected to a Billroth II procedure. Hospital deaths as a rule are due to such complications as pneumonia, cardiac conditions, embolism, or septic phenomena.

A compilation was made of the causes of death of patients who underwent gastric resection in the 18 year period from 1934 to 1952. In this group there were 363 deaths. Of those deaths related to the surgical disease, 40 were due to recurrent ulcer, 40 to carcinoma of the gastric stump, 22 to pulmonary tuberculosis, 19 to gallbladder disease, and 6 to ileus from adhesions. These cases constituted roughly one-third of all deaths; the other two-thirds were due to diseases unrelated to either the surgical disease or the operation.

Of the 40 deaths from recurrent ulcerative disease, 16 followed gastroenterostomy and 22 followed Billroth I or II procedures. However, there had been 309 Billroth operations and only 54 gastroenterostomies performed. Thus, the incidence of death from recurrent ulcer was 6.9 per cent following Billroth resections and 35 per cent following gastroenterostomy.

Recurrent ulcers were anastomotic in 38 of the 40 patients (92%). The other 2 ulcers were in the duodenum, and followed Billroth procedures. Ten of the patients with anastomotic ulcer had gastrocolic fistulas; 8 perforated, 4 bled.

The time interval between primary operation and secondary surgery for recurrent ulcer, or death from the complication, was between 1 and 5 years in 11 cases, 5 and 10 years in 7 cases, 10 and 20 years in 15

cases, 20 and 30 years in 6 cases, and 32 years in 1 case.

The relationship between pulmonary tuberculosis and gastric resection is based on the high rate of exacerbations of the pulmonary lesion in the first 6 months following surgery. The difficulty in determining quiescence of a pulmonary lesion is stressed.

The patients who died of carcinoma of the gastric stump may have had carcinoma at the time of primary gastric surgery. The relationship between gastric surgery and gallstones is not definite, although it is possible that gallstones may have gone unrecognized at the time of surgery. Also, dissection to excise the ulcer or to free the duodenum may be followed by stenosis of the common duct. —*Harold Laufman, M.D.*

Carcinoma of the Gastric Stump as a Late Problem in Ulcer Surgery (Das Magenstumpfcarcinom als Spaetproblem der Ulcuschirurgie). ROBERT KUEHLMAYER and OTTOKAR ROKITANSKY. *Langenbecks Arch. u. Deut. Zschr. Chir.*, 1954, 278: 361.

IN ORDER to determine the true incidence of carcinoma of the gastric stump following surgery for ulcer, it would be necessary to recall all living patients operated upon, as well as to know the cause of death of all patients who died. Since neither of these methods was feasible, the present study was based upon autopsy records only. The incidence of carcinoma following gastric surgery was compared with that in the general autopsy material on cases not operated upon during the 18 year period from 1934 to 1952.

Carcinoma of the stomach was found in 5.9 per cent of unoperated upon patients coming to autopsy. The peak incidence was between 50 and 80 years of age, and the ratio of men to women was just under 2 to 1. Of 363 patients with previous ulcer surgery, the incidence of stump carcinoma was 10.6 per cent following gastric resection and 12.9 per cent following gastroenterostomy; however, in the age group of 40 to 50, the percentage was 21 per cent as compared with 7 per cent in the group not subjected to operation. The ratio of men to women in the group operated upon was about 7 to 1.

The largest majority (82%) of patients with stump carcinoma lived 5 to 25 years after surgery. Only 6 per cent lived less than 5 years and 12 per cent more than 25 years. These figures are rather astounding, and imply that in a large number of cases the carcinoma must have arisen after surgery was done.

Attempts to correlate the incidence of gastric stump carcinoma with the type of operation performed (Billroth I, II, or gastroenterostomy) resulted in no significant information.

Comparison of the incidence of carcinoma of the upper areas of the stomach (fundus and cardia) in patients who were not operatively treated with that in patients who had undergone resection showed a ten times higher incidence in the resected group. One obvious deduction might be that the surgery predisposed to the malignancy, but this is unlikely. Another is the possibility that malignancy was present, but unrecognized at surgery. A third deduction is the coexistence of a small silent malignant lesion in the stomach together with a duodenal ulcer, the latter providing the indication for surgery. A fourth is the possible malignant degeneration of recurrent anastomotic ulcer. A fifth is the origin, de novo, of carcinoma in the gastric stump at some time postoperatively, without a previous ulcer, perhaps related to the relative anacidity resulting from a four-fifths resection.

The prognosis of stump carcinoma is poor. Gastrojejunal ulcers should be operated upon without delay. —*Harold Laufman, M.D.*

Small Gastric Cancer. MANDRED W. COMFORT, HOWARD K. GRAY, MALCOLM B. DOCKERTY, ROBERT P. GAGE, and Others. *Arch. Int. M.*, 1954, 94: 513.

THE RECORDS of 226 small gastric adenocarcinomas of 4 cm. or less in greatest diameter, which were treated by resection at the Mayo Clinic in the years 1940 to 1945, inclusive, have been reviewed. These small gastric cancers composed one-fourth of all gastric cancers for which resection was performed in these years. Clinically they tended to simulate benign gastric ulcer, and their malignant nature was recognized roentgenologically in only about one-third of the cases. Most important, the hospital mortality rate was lower and the 5-year survival rate higher for these small lesions than for those of all sizes. This numerically large segment of the resectable gastric cancers, difficult to distinguish from benign ulcer, offers a better and a more encouraging prognosis than resectable gastric cancer in general.

Several interesting and important facts evolved when these small gastric cancers were divided into four subgroups according to size, and the data were studied.

The smaller the growth the lower the incidence of higher grades of malignancy; the lower the incidence of metastasis the higher the incidence of symptoms of ulcer type, the longer the duration of symptoms, and the higher the gastric secretory activity.

The smaller the gastric cancer the more it lacked the roentgenologic features of malignancy and the less frequently was the malignant character of the ulcer recognized.

Hospital mortality rates for small gastric cancer were less than those for gastric cancers of all sizes, and were of the same order as those for benign gastric ulcer.

The smaller the gastric cancer the higher was the 5-year survival rate.

For small gastric cancers, 5-year survival rates were higher when the symptoms were of the ulcer type, or of long duration, or when gastric secretory activity was high than when symptoms were of the nonulcer type, or of short duration, or when gastric secretory activity was low.

The hope that a small gastric cancer is more amenable to therapy and entails a better prognosis than gastric cancer in general is clearly justified by the data obtained in the study of this series of 226 such cancers.

The Technique of Our Method of Transabdominal Total Gastrectomy in Cases of Gastric Cancer. I. BOEREMA. *Arch. Chir. Neerl.*, 1954, 6: 95.

BOEREMA has described a new method of total gastrectomy. With this technique it is unnecessary to open the pleural cavities and to make a supradiaphragmatic

anastomosis between the esophagus and a segment of the jejunum. The use of the author's plastic apparatus enables the surgeon to perform the operation by the transabdominal route so that thoracotomy is no longer necessary. The article is profusely illustrated.

—*Robert Turell, M.D.*

The Problem of Nutrition Following Complete Gastrectomy. H. J. McCorkle and Harold A. Harper. *Ann. Surg.*, 1954, 140: 467.

The records of 36 patients who had undergone complete gastrectomy were evaluated, and from a postoperative nutritive standpoint it appeared preferable to maintain continuity between the esophagus and duodenum either by direct anastomosis or by interposing a segment of jejunum or colon. It is possible to maintain weight and activity in spite of the difficulties of alimentation and metabolism.

In a series of 120 experiments on dogs it was observed that (1) alimentation time is decreased to less than one-half that of the normal controls; (2) the rate of absorption of amino acids was more rapid than in the controls; (3) in most instances, the totally gastrectomized animals remained in positive nitrogen balance; (4) the absorption of glucose was accelerated after gastrectomy, but there was also a more rapid fall in the blood sugar levels; (5) the rate of absorption of fat was moderately increased; (6) anemia occurs following total gastrectomy, but may be minimized by supplementary vitamin therapy; (7) in dogs, following total gastrectomy, good nutrition and weight were maintained if the animals could be given isoperistaltic continuity between the esophagus and duodenum and if they could be trained to eat slowly.

—*W. Foster Montgomery, M.D.*

Lymphosarcoma and Reticulosarcoma of the Stomach and Intestine (I linfo e reticolo-sarcomi dello stomaco e dell'intestino). Pasquale Scalfati. *Policlinico*, sez. chir., 1954, 61: 273.

The author reports on 9 cases of reticulocell sarcoma of the digestive tract observed at the Institute of Pathology and Surgery, Rome, from 1946 to 1952.

Diagnosis of the condition is considered very difficult and the majority of patients are operated on with the diagnosis of carcinoma or ulcer.

The ages of the author's patients varied from 6 years to 70 years. Four of the patients were males and 5 were females. The stomach was most often involved in the females (4 out of 5). In the males, the lesions were in the stomach in 2 cases and in the jejunum in 2. Regional metastasis was present in 6 cases.

Five of the 9 patients are living 7 years after surgery. The shortest follow-up has been for 1 year (the last case). Of the 4 patients who did not survive, the postoperative survival varied from 4 months to 1 year.

Treatment consisted of ample resection followed by X-ray therapy. A review of the literature is presented.

—*Lucian J. Fronduti, M.D.*

Diagnosis and Management of Acute Intestinal Obstruction. Clarence J. Berne and J. Howard Payne. *Surg. Clin. N. America*, 1954, 34: 1403.

Intestinal obstruction is defined as a situation characterized by a cessation of the forward motion of the fecal stream. Acute intestinal obstruction exists when any mechanism suddenly prevents most of the intraluminal fluid from passing the involved level of the intestine. Even in the absence of oral intake, as much as 5 liters of intestinal content will pass the upper ileum each day and most of this material returns to the blood stream upon reaching the lower ileum and right colon. This fluid may be looked upon as filtered blood. The blood protein elements are retained in the vascular system.

Acute obstruction high in the small intestine is productive of early nausea and vomiting, severe fluid loss, and minimal distention. Acute obstruction of the colon below the dehydrating area may be characterized as reservoir distention by gas and feces, a much less dynamic process symptomatically. Obstructions above the colonic reservoir will permit reservoir function until the colon has been emptied, in its usual manner, of its normal contents.

Simple obstruction is the pattern basic to all obstructions. It consists of the intestinal tube obstructed at some level, open at the proximal end, and having an inflow of fluid laterally and of fluids and air proximally. Such a tube can regurgitate proximally and is thereby inherently partially decompressed. The lesion causing the obstruction is silent and can be typically an adhesive band. A second characteristic of simple obstruction is that it involves only the fecal stream; there is no initial obstruction of the blood stream passing through the bowel. As time passes and distention increases, hydraulic pressure disturbances develop. These are dependent upon intraluminal hypertension which compresses the vascular plexuses of the submucosa. Hypoxia of the intestinal musculature results and leads to motor decompensation.

Thirdly, a characteristic of simple obstruction is the accumulation of ingested substances in addition to those juices secreted above the obstructed segment. The most important of these substances is swallowed air. The increase in air volume continues until the obstruction is well developed. This phenomenon increases with the progress of colon obstruction, but radiologically seems to decrease in advanced obstructions of the small bowel. The swallowed air is largely nitrogen and is a foreign body. The fluid accumulation consists of a mixture of ingested liquids and unabsorbed secretions. The electrolyte content of the fluid is generally moderately hypotonic, but the range of electrolyte concentration varies widely. In acute obstruction averages will show the sodium and chloride content of fluid of the small intestine to be about two-thirds isotonic, and the potassium content to be approximately isotonic. Ingested fluids plus gastric, hepatic, pancreatic, and intestinal secretions may easily total over 10 liters per day, and yet at the time of death from ileac obstruction the intestinal fluids will usually not exceed 5 liters.

A fourth characteristic of simple intestinal obstruction is that the segment below the obstruction tends to function normally and empty itself. Thus, obstipation as a feature of importance in diagnosis cannot be established early in the course of obstruction of the small intestine.

Closed loop mechanisms markedly shorten the time necessary for the production of advanced pathological

changes. They differ basically from simple obstruction because the absence of an open proximal end prevents regurgitation. Strangulation is basically and initially a compression of the veins which drain the involved segment. The venous occlusion, with the artery patent, determines that the blood flowing into the segment is caught in the loop and is lost from the circulation as effectively as if it had been lost by hemorrhage. In the case of large loops, this loss may easily be productive of severe systemic hemorrhage effects. The blood caught in the involved segment rapidly leaves the vessels. Having become interstitial, the blood passes through the serosa, permeates the peritoneal fluid, and provides the basis for peritoneal irritation and the accompanying clinical signs of diffuse abdominal tenderness and rigidity. The rapidity with which the process develops and the length of the segment of bowel determine the clinical features.

Mesenteric vascular occlusion resulting from venous thrombosis is associated with a gradual onset and a disarmingly slow progression. As the thrombosis extends and anoxia replaces hypoxia in the bowel wall, the resultant gangrenous process produces obstruction. Mesenteric occlusions due to obstruction of arterial inflow by embolism, thrombosis, or unexplained arterial spasm are much more sudden and severe. Major occlusions closely resemble severe strangulations, whereas minor occlusions are compatible with spontaneous recovery, usually masquerading under some other diagnosis.

It is important to realize that the clinical features of acute intestinal obstruction are largely determined by the basic mechanisms of, and the reaction to, obstruction rather than by the disease producing it.

The authors presented a coordinated plan of concurrent diagnostic and therapeutic procedures that should be instituted when intestinal obstruction is suspected. Early operation, with certain exceptions, is advocated as the treatment of choice in intestinal obstruction. The authors emphasized that decompensated mechanical obstruction may persist after surgical correction of the obstructing mechanism unless the intestine is emptied by aspiration. In advanced intestinal obstruction, that is best accomplished at the time of the operation. Their technique is well described. —*Robert Turell, M.D.*

The Synchronous Combined Abdominoperineal Excision in the Treatment of Rectal Cancer; Study of 28 Cases (A excisão abdominoperineal combinada síncrona no tratamento do carcinoma rectal; estudo sobre 28 casos). MÁRIO ANDRADE and E. LIMA BASTO. *Clin. contemp.*, 1954, 8: 1.

TWENTY-EIGHT patients with rectal cancer have been operated upon during the past 3 years, with use of the method of Lloyd Davies of the hospital of St. Marks, London, England, in 1939. The period of 3 years is, of course, much too brief to permit of generalizations with reference to recurrence and other aspects concerning the ultimate results. The authors therefore can give only the immediate results, together with their impressions with reference to the value of the surgical procedure here employed.

With reference to immediate results, therefore, it may be stated at once that there was no immediate mortality. One patient died 17 days after the operation of pulmonary embolism; 1 died 10 days after operation, of paralytic ileus, and a third patient died 9 days after operation, of purulent peritonitis. These figures do not mean that the material was highly selected. Most of these patients were still fairly young and robust; nevertheless, the neglected character of their condition as a whole is evidenced by the fact that in 7 instances the rectovaginal septum was invaded, rendering its extirpation necessary, and in 4 instances the tissues of the perineum were invaded, rendering dissection difficult. One patient survived for 2½ years, 2 patients survived for 2 years, 12 for 1 year, and 11 for less than 1 year.

Of course, as in Davies' work, the greatest pains were taken with preoperative preparation of the patient and postoperative care; however, when all the requirements are met, the technique is one that is excellently adapted to procure good immediate, and even ultimate, results where adequate surgical equipment is available and two surgeons can be associated (one to perform the perineal portion of the operation and the other to do the laparotomy) who are able to co-operate with one another to advantage. By this means the planes of cleavage can be found in collaboration, the blood vessels can be more effectively ligated, and last but not least the operation can be essentially shortened with resultant lessening of shock. —*John W. Brennan, M.D.*

Imperforate Anus with Rectovesical, Urethral, Vaginal, and Perineal Fistula. WILLIS J. POTTS, WILLIAM L. RIKER, and ARTHUR DEBOER. *Ann. Surg.*, 1954, 140: 381.

THIS ARTICLE deals with 22 rectovaginal fistulas, 8 rectourethral fistulas, 9 rectoperineal fistulas and 12 rectovesical fistulas that were complicated by congenital imperforate anus.

Although 26 female infants had either rectovaginal or rectoperineal fistulas, not 1 had a rectovesical or rectourethral communication. Forty-one patients were admitted and operated upon during the neonatal period; the remainder was seen at ages varying from 2 months to 7 years, during which time treatment had been given elsewhere.

The authors discuss lucidly the diagnosis, preoperative preparation, operative techniques for the various types of fistulas, postoperative care and complications, the mortality rate, and the results. The operations are well described and adequately illustrated.

Colostomies are rarely performed for congenital anomalies of the rectum largely as a result of the availability of antibiotics. A combined abdominoperineal operation is used for patients with rectovesical and rectourethral fistulas. For infants with rectovaginal or rectoperineal fistulas, the authors have devised a somewhat new operation that resulted in the formation of a near normal rectum.

In the discussion, Ravitch called attention to Pott's emphasis on preserving the sphincter and working through its rather tiny orifice, which to him is the nub of the entire procedure and the most important single point. Also important is the making of a relatively small anal orifice which can be dilated, rather

than a relatively large one that can never be satisfactorily closed. Dilatation of the new anal orifice by the mother with her little finger is of incalculable importance. —*Robert Turell, M.D.*

LIVER, GALLBLADDER, PANCREAS, AND SPLEEN

On the Dissolving Power of Lecithin and Bile Salts for Cholesterol in Human Bladder Bile. BJÖRN ISAKSSON. *Acta Soc. med. Upsaliensis*, 1954, 59: 296.

THE AMOUNT of cholesterol in human bladder bile is remarkably high. The bile salts have usually been regarded as the only component in bile with the power to dissolve cholesterol. Some authors, however, are of the opinion that the fatty acids are of greater importance in that respect. It has also been shown that lecithin enhances the capacity of the bile salts for dissolving cholesterol and that human bladder bile contains a large amount of lecithin.

The present study is concerned with the degree that lecithin accounts for the cholesterol dissolving power of the system. From the experiments, it was seen that the bile salts alone are not sufficient to disperse the actual amount of cholesterol in normal human bladder bile, that lecithin enchances the cholesterol-dissolving capacity of the different bile salts, and that it is an indispensable component for the dispersion of cholesterol in human bladder bile.

Moreover it was found that the ratio of lecithin-bile salts system to cholesterol must be within the range of from 10 to 1 to 12 to 1 for bladder bile from patients with a normal bile tract, but for patients with gallstones the ratio is usually below that range. Different mixtures of prepared egg lecithin and synthetic conjugated cholic and desoxycholic salts were tested for their cholesterol-dissolving capacity. The best mixtures were found to be those with 35 per cent lecithin, or a little lower. Mixtures with the conjugated desoxycholic salts were superior to those with conjugated cholic salts. No differences between the tauroconjugates and glycoconjugates were found. There were noted some influences of the pH value.

In some ways the results in this study were conflicting with those of earlier investigators. The reason for this seems to lie in the fact that the present investigation has been worked out with synthetic bile salts which are as pure as possible, and with lecithin and cholesterol preparations containing only negligible amounts of impurities.

—*Stephen A. Zieman, M.D.*

Pancreatitis. ROBERT M. ZOLLINGER, LUTHER M. KEITH, JR., and EDWIN H. ELLISON. *N. England J. M.*, 1954, 251: 497.

IN ACUTE PANCREATITIS correct diagnosis is imperative since operation is contraindicated. The most useful diagnostic test is the blood amylase level which remains elevated for 2 or 3 days and is frequently not diagnostic by the third day. The amylase values of peritoneal fluid remain elevated from 2 to 4 days longer.

Roentgenograms in acute pancreatitis may reveal gall stones, pancreatic calcification, or paralytic ileus. Occasionally a pleural effusion in the left lower portion of the chest may be present.

The aim of therapy in acute pancreatitis is to put the pancreas at rest and to relieve pain. Food should be withheld and gastric suction should be instituted to control abdominal distention and to remove gastric juice. Gastric juice in contact with duodenal mucosa releases a secretion which stimulates the pancreas. Atropine, banthine, and probanthine can be used to depress both pancreatic and gastric secretion. Blood volume replacement is important. Twenty-eight patients with acute and chronic pancreatitis showed an average whole blood volume deficit of approximately 1,500 c.c. Antibiotics should be used as prophylaxis against secondary infection. Chlortetracycline and oxytetracycline are the antibiotics of choice because they are concentrated in bile. One gram of calcium gluconate a day given intravenously is required by patients with lowered calcium levels. Oral feedings should be withheld for at least 48 hours after subsidence of the symptoms. After recovery from the acute attack cholecystectomy and exploration of the common duct should be done.

Most patients surviving acute pancreatitis will not have succeeding attacks, particularly if existent biliary tract disease is overcome. However, recurrent or chronic pancreatitis will develop in some, the criteria being three attacks, calcification on roentgenographic examination, or confirmation by biopsy. Medical management of these patients is usually futile, and surgical intervention is necessary.

Sphincterotomy, vagotomy, partial gastrectomy, and biliary shunts all have a sound physiologic basis and a definite place in the management of chronic pancreatitis. Clinical results obtained by direct retrograde anastomosis of the pancreatic duct to the jejunum have been encouraging.

One hundred thirty-four cases of pancreatitis of all types were treated by the authors between January, 1947 and January, 1954. The mortality was 12.6 per cent. —*Frederick W. Preston, M.D.*

MISCELLANEOUS

Conservative Therapy of Intra-Abdominal Abscesses (Zur Frage der konservativen Behandlung intra-abdomineller Abscesse). KURT HOERHOLD. *Chirurg*, 1954, 25: 252.

PERIAPPENDICEAL abscesses are treated with the application of an icebag which is replaced by a hot water bottle as soon as acute symptoms have subsided. Inasmuch as orally or parenterally administered antibiotics do not reach the abscess cavity, the author introduces a heavy gauge needle through the abdominal wall into the abscess, aspirates the pus, and injects from 200,000 to 600,000 units of penicillin, with from 1 to 2 gm. of streptomycin, into the abscess cavity. The procedure is repeated on 2 successive days. In 2 cases a phlegmon of the abdominal wall resulted from the procedure.

Pelvic abscesses in males are approached in a similar manner, through the rectum, while in female patients a paracentesis of the posterior vaginal wall is performed. The author accedes that equally good results

in women may be obtained by colpotomy, but in men he considers his method superior to incision of the rectal wall because the danger of hemorrhage or of injury of the urinary bladder is avoided.

The method failed in 2 cases of subphrenic abscesses. Multilocular abscesses are not considered suitable for this type of therapy. If the pus is thick, heavy gauge needles should be used to avoid infection of the abdominal wall. If the pus is thin, the formation of a phlegmon can be avoided if instillation of antibiotics is followed by incision and drainage.

—Joseph K. Narat, M.D.

The Possibility of Preservation of Function in Visceral Exenteration of the Pelvic Organs for Advanced Cancer (Les possibilités de conservation fonctionnelle dans les exentérations viscérales pelviennes pour cancers avancés). M. DARGENT. *Helvet. chir. acta*, 1954, 21: 304.

THE AUTHOR DISCUSSES the indications and contraindications for radical surgery in advanced cases of carcinoma of the pelvic organs (bladder, prostate, uterus, rectum) and describes techniques which permit the preservation of function of the anus even in partial or complete evisceration.

Surgery of advanced carcinoma is, by definition, a mutilating operation, but it is justified in cases in which (1) it is the logical and most effective method of relieving severe pains or functional disturbances in the affected organs; (2) the situation of the patient will be not worse after the intervention than that which the spontaneous development of the disease would have brought about; (3) there is a remote chance of accomplishing a permanent cure.

The operation should be avoided if the purpose can be accomplished by other means with less risk. This is true especially for advanced carcinoma of the prostate in which radiotherapy, hormone treatment, and palliative minor surgery serve the purpose better than radical operation.

The same reasoning applies to advanced carcinoma of the bladder and rectum. If there are marked metastases in the pelvic lymph nodes and invasion of the adjacent organs, radical surgery is rarely justified. In advanced carcinoma of the rectum, deep roentgen therapy often alleviates the pains for 6 to 8 months, and simple permanent colostomy improves the general condition so much that treatment should be limited to these procedures.

Practically all cases in which radical exenteration can be done successfully are advanced carcinomas of the cervix with involvement of lymph nodes and other pelvic structures. Brunschwig was the first one to show that these operations are possible and can give an acceptable functional result if the cases are selected judiciously.

The author discusses in detail the different techniques of this operation. The intervention should be as conservative as possible. In many cases permanent colostomy can be avoided, and the distal portion of the rectum can be preserved. The carcinomatous infiltration involves nearly always the middle portion of the rectal ampulla. This part is resected, but in most cases it is possible to preserve a cylinder of the distal rectum of at least 6 cm. length. The posterior aspect of the rectum is then dissected and pulled up so that an end-to-end low sigmoidorectal anastomosis can be performed under protection of a temporary cecostomy. The author quotes cases in which, with this method, the patients survived for 2, 3, or 5 years.

If the rectum is intact and only the bladder is invaded a cystocolpohysterectomy is performed, and the ureters are implanted in the intestine.

Six cases of advanced carcinoma of the cervix with invasion of pelvic organs and lymph nodes are described in detail. One patient was well and free of metastases 15 months after the intervention, and one died 6 months after the operation of metastases in the liver and spleen. The other 4 patients died soon after the operation.

—Werner M. Solmitz, M.D.

GYNECOLOGY

UTERUS

The Management of Carcinoma of the Corpus. JAMES A. CORSCADEN and HAROLD M. M. TOVELL. *Am. J. Obst. Gyn.*, 1954, 68: 737.

THE AUTHORS REPORT the results of treatment of cancer of the corpus in the Sloane Hospital for Women, New York, during the years 1938-1948 inclusive, a decade when the standard form of therapy was the intracavitary application of radium, followed by hysterectomy 6 to 8 weeks later. Their purpose was to study the results of treatment of cancer of the corpus, especially treatment with radiation; to present some observations having to do with the background of cancer; and to study certain factors which seem to influence the prognosis. Intracavitary application of radium was considered a partially satisfactory method of therapy for carcinoma of the corpus. The 5 year survival rate was 33.3 per cent; 4 of these patients later succumbed to carcinoma.

A small percentage of cancers of the corpus (5 to 10 per cent) are very lethal, and metastases develop probably before the condition is clinically manifest.

Cancer of the corpus in most cases remains localized in the uterus for a long time and is cured either by operation alone or by intracavitary radium followed by operation. Early diagnosis is therefore desirable.

In cancers of large size involving the whole endometrium and enlarging the uterus, preoperative radium therapy apparently gives 5 year results that are superior to those following operation alone.

A surprisingly high percentage of 5 year cures followed treatment of microscopic and gross metastatic lesions in the adnexa.

In no case in which the disease had spread beyond the adnexa was a cure obtained. The more anaplastic tumors are the more actively growing tumors which have a higher mortality than the more differentiated tumors. The more anaplastic tumors penetrate deeper into the myometrium, and metastasize more frequently to the adnexa. The deeper the invasion of the tumor into the myometrium, the higher the mortality. Cancers that show no response to irradiation are associated with a higher mortality rate than are those that do respond to irradiation. —*Charles Baron, M.D.*

ADNEXAL AND PERIUTERINE CONDITIONS

Histochemical Studies on the Tubal Epithelium of the Woman (Ricerche istochimiche sull'epitelio tubarico della donna). GIUSEPPE BALBONI. *Riv. ostet. gin.*, Firenze, 1954, 9: 164.

EIGHTEEN PAIRS of human fallopian tubes, removed from women in different phases of the menstrual cycle and at various ages (31 to 50 years), form the material for this report. The tubes were removed by hysterosalpingectomy for diseases extrinsic to the tubes themselves (mostly fibromas and fibrosis uteri). In 4 of these 18 patients the menstrual phase could be established by concomitant endometrial biopsies or specimens; in 5 more an approximation could be made in this respect from the history of menstrual regularity; in the rest the menstrual irregularities did not permit conclusions as to the menstrual phase.

Histologic study of this material disclosed the fact that during the proliferative phase of menstruation there is a progressive increase in the cellular nucleotids with progressive transformation of the ciliated cells containing relatively little nucleinic acid, into transition cells and into frankly secretory clublike and gobletlike cells with relatively conspicuous amounts of the nucleotids and, in addition, with cytoplasmatic material positive to the Schiff periodic-fuchsin test for the presence of polysaccharides.

During the secretory phase of menstruation there was an accentuation of the afore-discussed phenomena with the additional appearance of rodlike cells (Stiftchenzellen) and of the so-called clear cells which are entirely without colorable material.

However, what the author particularly wishes to emphasize is the fact that transition forms occur between all the various types of cells. There occurs what seems to be a transition form between the tall ciliated proliferative phase cells lining the fallopian tube and the nonciliated cells. This is the phenomenon in which the ciliated cell becomes positive to the Schiff test, or to para-aminosalycyclic acid, and pushes this stained material toward the cell apex, the material finally breaking through and discharging into the tubal lumen. In these transition cells some of the cilia even persist, and there has been some discussion as to whether, following this discharge of secretions, these cells might not regenerate themselves and reconstruct their ciliated margin. However, the author doubts this for the reason that he has found mitoses in this ciliated epithelial lining of the tubal lumen, particularly in the postmenstrual period when the lining cells are lower (cubical), uniformly ciliated, and apparently in the resting stage before growing in stature (tall cylindrical) and reassuming the evidences of secretory, or "preparatory-secretory," activities. This causes the author to believe that after the accomplishment of the secretory function of the cells they are discarded and replaced by new cells developing from the basal cells of this lining epithelium.

In this process of being discarded the author even imagines a further process of transition—from the tall ciliated cell, through the secreting cell to the so-called clear cell which is left after the secretions have all been extruded. Even here there would seem to be a transition cell in the guise of the lower cell with the strongly Feulgen-positive nucleus and the transparent halo encircling the nuclear membrane. Perhaps this cell goes over into the goblet cell and the goblet cell into the rodlike cells with protoplasm staining densely for ribonucleic acid and with a compressed look.

It is considered, indeed, that these last mentioned cells are exhausted cells in the process of expulsion

into the tubal lumen and may form the source of the positive ribonucleinic reaction of the tubal contents which are also positive to the polysaccharides as shown by the Schiff (McManus-Hotchkiss) reaction. The ribonucleinic acid content may thus represent the holocrinic component of the tubal content, the merocrinic content being represented by the Schiff-positive material. The holocrinic component suggests a hormonal function.

As to the merocrinic component (polysaccharides), the author thinks that it may, indeed, have something to do with the nourishment of the ovum during its transition through the fallopian tube.

However, all in all, the author is careful to insist that these changes and transitions are mere suppositions, gained by a general observation of the topographic—the so-called secretory cells are more numerous during the secretory phase of the menstrual cycle—and histochemical behavior of the tubal epithelium of the human female, as well as by studies of animals and of the literature.

—*John W. Brennan, M.D.*

MISCELLANEOUS

Conservatism in Endometriosis. JOHN I. BREWER and FRANK M. MAHER. *Am. J. Obst. Gyn.*, 1954, 68: 549.

THE MANAGEMENT OF PATIENTS with endometriosis must be highly individualized because of the multiplicity of problems in diagnosis and in the selection of therapy. The management of patients with endometriosis is dependent upon the establishment of a correct diagnosis and an accurate interpretation of the potentialities of the various types of therapy.

The diagnosis of endometriosis must be made during the bimanual examination if the treatment is to be correctly applied. The degree of accuracy of the diagnosis of endometriosis is adversely affected by the cases in which operations are performed for symptoms not corroborated by physical findings. Such cases often are not endometriosis. The physical findings indicative of the condition must be present before operation is advised.

One may fail to make the diagnosis because of several reasons. The most frequent reason is the failure of the examiner to palpate the posterior cul-de-sac and uterosacral ligaments vaginally and rectally in every patient. Other reasons are the inability to detect small peritoneal lesions and those more definite lesions that are obscured by coexisting pathologic processes such as fibroids, inflammatory disease, large ovarian tumors, and genital malignancies. Lesions located in the anterior cul-de-sac, and small extraperitoneal lesions in the bladder wall are frequently obscure. Acute pathologic processes in the pelvic tissues also render a diagnosis difficult or impossible to make.

Accuracy of diagnosis can be determined only by a study of the patients operated upon. The degree of accuracy will be affected considerably if the pathologist's diagnosis of endometriosis is required to confirm the surgical and clinical interpretations. Histologic examination of the removed tissue does not always reveal endometriosis even though it is present. Another frequent source of error occurs in the pathologic study of a blood-filled cyst of the ovary. Routinely, only a few microscopic sections are made from the wall of the cyst and the diagnosis is dependent upon a study of this infinitesimal portion of the tumor. More complete sectioning of the cyst wall may reveal endometriosis in some small region.

Conservative management consists of: no treatment; medical management; temporary castration with radiation; and procedures which retain the childbearing function. Some gynecologists consider an operative procedure conservative if the uterus is removed but the ovaries are retained. This procedure when performed on a young woman would be radical. The best way to be assured that the treatment is conservative is to use no therapy at all and/or use very simple medical management. An operative procedure that is intended as a conservative one frequently may terminate as a radical one because the pelvic organs may be more extensively involved than anticipated. Also, the gynecologist may do an incomplete conservative operation while realizing that it is undoubtedly inadequate. Since patients with all types and degrees of severity of endometriosis can and do become pregnant, and since it is acknowledged that all patients with endometriosis do not require treatment, there is no great urgency to advise operation. Unless there is some dramatic occurrence, such as intraperitoneal bleeding, or the symptoms are severe, time is often helpful and some procrastination is justified.

The objective of conservative surgical procedures is the relief of symptoms and/or the removal of potential hazards without interference with future child bearing. This is not easy of accomplishment. It is here that individualization of therapy is so urgently required. Each factor must be considered and weighed in the light of past clinical observation and experience. If it is not possible to retain childbearing function, an effort is made to conserve some ovarian tissue, even though the uterus is removed, provided that the status of the patient warrants such a procedure.

The decision that a procedure which conserves childbearing function will be suitable is usually not made until the pelvic organs are inspected at operation. It is then based upon the operator's opinion that the symptoms can be relieved with sufficient certainty to justify the procedure. In some instances, it is based on the operator's belief that the procedure will enhance subsequent fertility.

Despite the inadequacy of the statistical methods and the uncertainty concerning the question of whether an operative procedure in itself enhances fertility, there is one point that these clinical observations have firmly established—when operations are performed for endometriosis or when endometriosis is encountered during any abdominal operation, approximately one-third of the patients will subsequently conceive if conservative procedures are performed and if there are no other causes for sterility. For this reason conservatism is advocated when operations are indicated in patients who are desirous of having children and when retention of such function is compatible with the individual situation. —*John R. Wolff, M.D.*

OBSTETRICS

PREGNANCY AND ITS COMPLICATIONS

Circulatory Adjustments to Pregnancy. C. SIDNEY BURWELL. *Bull. Johns Hopkins Hosp.*, 1954, 95: 115.

OBSERVATIONS of significant adaptations to pregnancy show an increased oxygen consumption, an increased heart rate, an increased cardiac output, an increased blood volume, an increase in total body water, a rise in red cell mass, and an increase in venous pressure in the legs. These physiological adaptations to pregnancy are not static (after they are established) but follow a developing pattern. As the fetus grows there is, for about the first 8 months or so, a progressive rise in cardiac output, but in the last weeks of pregnancy, while the fetus continues to grow, the cardiac output diminishes and the heart rate falls. Blood volume also diminishes. At the same time the oxygen consumption, the red cell mass, the leg venous pressure, and the total body water are staying at a high level or even continuing to rise further. —*Charles Baron, M.D.*

A Case of Cervical Pregnancy (Um caso de gravidez cervical). ALBERTO COSTA. *Rev. port. obst. gin.*, 1954, 6: 263.

THE PATIENT here discussed was a 25 year old colored woman, a native of Mozambique (Portuguese East Africa), who entered the service of the author at the Central Hospital Rainha D. Amélia in the city of Beira where the author is Chief of Staff. The patient was 3 months pregnant with her first child. The pregnancy had been normal until the 24 hours before her entry when bleeding had occurred and was, for some moments, severe. There was no pain. Shortly after admission a 16 cm. embryo was expelled.

When the patient was examined the same day the external orifice of the cervix was found to admit 2 fingers. The anterior pole of the cervical lip was occupied by a pyriform formation at the posterior two-thirds of the vagina, giving the impression that the patient was suffering from genital prolapse.

On passing the external orifice the examining fingers encountered the ovulary adnexae which adhered almost exclusively to the right half of the cavity. When the secundinae had been removed, the problem of the nature of the containing cavity remained. On exploration with the vaginal speculum the communication with the cavity of the uterine body was discovered, the entrance to which was barely permeable to the uterine probe. The true uterine cavity measured 8 cm. in length. The raw surface of the right wall of the cavity where the products of pregnancy had nested marked the area of attachment of the ectopic pregnancy. There followed no trace of postpartum complications and the patient was discharged on the ninth postpartum day entirely recovered.

The case of cervical pregnancy reported is the forty-sixth instance described in the world literature and the first in the Portuguese literature.

Since the usual termination of these ectopic pregnancies is abortion not later than the third month, it is superfluous to speak of the infant prognosis; the maternal mortality has been about 3 per cent. The instance of the Barcelona woman who carried a living girl child to term is an exception which proves the rule. —*John W. Brennan, M.D.*

Gunshot Wounds of the Pregnant Uterus: Review of the Literature and 2 Case Reports. ALFRED J. KOBAK and CARLYLE H. HURWITZ. *Obst. Gyn.*, 1954, 4: 383.

THE WORLD'S LITERATURE on gunshot wounds of the pregnant uterus has been reviewed and 2 additional case reports are presented. A total of 33 cases are analyzed. The over-all mortality was 9 per cent, with no deaths occurring since 1912. The authors state that laparotomy should be performed to discover the extent of intra-abdominal damage, and proper steps taken to repair it. The condition of the fetus, mother, and uterus must be considered in deciding upon the proper management.

Evidence would seem to indicate that with a small repaired hole, the uterus can perform good labor without rupturing. Where there has been a large tear in the uterine musculature it would be wiser to perform a cesarean section rather than permit the uterus to go into labor. In occasional instances in which the uterine damage is extensive, a hysterectomy may be indicated. —*Alan Rubin, M.D.*

Treatment of the Acute Toxemias of Pregnancy with Hypotensive Drugs. ROBERT W. KISTNER. *J. Obst. Gyn. Brit. Empire*, 1954, 61: 463.

THIRTY-SEVEN PATIENTS with pre-eclampsia, 2 eclamptic patients, 7 patients with essential hypertension and superimposed pre-eclampsia, and 2 patients with essential hypertension alone were treated with one or more hypotensive drugs. No sedation was given. Veratrone (veratrum viride alkaloids), verenteral (a newer veratrum viride preparation), and apresoline were utilized separately and in conjunction with each other. Tetraethylammonium chloride was employed first to determine the presence of "neurogenic" hypertension.

Veratrone in acute toxemia produced a constant hypotension bradycardia and was usually associated with nausea and vomiting. Temporary diminution in urinary output was noted during the period of maximum hypotension. Verenteral produced similar results but was associated in 4 cases with ventricular extrasystoles.

Apresoline, in acute toxemia, produced a marked hypotension and tachycardia. Headaches occurred in 32 per cent of the patients. The urinary output was not suppressed. Subjective and objective clinical improvement occurred routinely following administration of this drug.

The hypotensive drugs, used without sedation, offer a physiologic mechanism for the release of the vasospasm associated with the acute toxemias.

While these drugs are not as yet recommended as complete treatment for the acute toxemias of preg-

nancy, they offer definite promise and are worthy of extensive pharmacologic and clinical investigation.
—*Alan Rubin, M.D.*

Emphysematous Colpitis in Pregnancy (Sulla colpite enfisematosa in gravidanza). F. DESTRO. *Ann. ostet. gin.*, 1954, 76: 24.

THE PATIENT was a 29 year old primipara who was in labor at the eighth month of pregnancy. The only findings, aside from the obvious evidence of impending premature delivery, were numerous vesicles disseminated over the surface of the vagina (anterior, posterior, and lateral walls, and the two fornices). They ranged in size from that of the head of a pin to that of a small pea.

Immediately following delivery a biopsy specimen was procured from the anterior wall of the vagina, one from the posterior wall, and one each from the two lateral walls and the two fornices. These tissue specimens were immediately fixed in 10 per cent formalin. On the eighth day of the puerperium the patient was dismissed; the vesicles, although still present, seemed to have diminished in number.

The histologic examination brought out the following salient facts: the vesicles did not have any epithelial lining or other membrane separating them from the surrounding submucous tissues; there was merely a condensation of the connective tissue mesh, as though the result of expansive pressure. The periodic fuchsin stain of Hotchkiss demonstrated the presence of glycogen in the vaginal epithelium and the presence of mucinous substances diffused throughout all the tissues examined; these findings are, of course, rather characteristic of late periods of pregnancy. There were some distended cavities suggestive of dilated lymph channels; these cavities were, however, easily distinguishable from the afore-mentioned vesicles. There were a few areas exhibiting collections of neutrophils, a few eosinophils and rare mononuclears, plasma cells, and hyperplastic histocytes. There was an extensive and pronounced intercellular edema.

On the negative side, no bacteria were demonstrated and no breaks were found in the epithelial lining of the vaginal cavity. In the absence of such demonstration it is, of course, impossible to erect a positive hypothesis as to the etiology of these vesicles; nevertheless, the author is of the opinion that some of the normal flora of the vagina do get through breaks, perhaps inconspicuous ones, in the mucosal epithelium and attack the glycogen and polysaccharides of the mucin content of the mucosa, and in this way generate the gases contained in the vesicles. The fact that many of the vesicles, even the largest, did not present any evidence of inflammatory reaction in their walls was ascribed by the author to the possibility that the gas was foreign and subsequently transported for some distance in the loose subcutaneous tissues of the vaginal wall.

Finally, the fact that some of the vesicles were filled with fluid (some showed deposits along the walls suggesting coagulated albuminous substances, while others were filled with gas) is explained on the basis of two different stages of evolution of the same pathologic process.
—*John W. Brennan, M.D.*

The Management of Heart Disease in Pregnant Women. C. SIDNEY BURWELL. *Bull. Johns Hopkins Hosp.*, 1954, 95: 130.

THE PRINCIPLE of management in dealing with heart disease in the pregnant woman is that of adopting ways and means to limit or restrict the cardiac output and the total blood volume. The physician must be concerned with the algebraic sum of factors influencing output, rate, and volume, and with the total cardiac load resulting from the patient's total situation, including pregnancy. An attempt is made to make a place in the patient's cardiac budget for the expenditures of pregnancy by eliminating equivalent amounts of other expenditures. Various factors demand an increase in cardiac load and have the further essential characteristic that they can be limited or eliminated. The objective is not necessarily to keep the total load at a minimum, but to keep it safely within the individual patient's tolerance.

Individual factors in patients' lives which lead to increase in heart rate, cardiac output, or blood volume include the following: physical activity, emotional stress, ectopic rhythms with tachycardia, anemia, obesity, infection, and hyperthyroidism.

Factors that influence the blood volume may influence the course of the pregnant woman with heart disease. Sudden increase of blood volume, such as is brought about by infusions or transfusions, has been known to precipitate pulmonary edema. This danger can be prevented by controlling the volume and rate of infusion or by avoiding them. Phlebotomy is a successful method of therapy in certain acute and threatening situations.

Women with mitral stenosis and pregnancy, on the whole, do well with informed medical treatment. In many instances pregnant women with mitral stenosis can undergo an operation on the mitral valve and continue the pregnancy to a successful conclusion. Most of these women would probably do well without an operation if the medical supervision were adequate. The total situation is more complicated in pregnancy than it is when the same patient is nonpregnant, and therefore the operation can be expected to carry a higher hazard. There may be reactivation of rheumatic fever after mitral valve surgery. Surgery of the mitral valve during pregnancy should be recommended only in rare and special cases.
—*Charles Baron, M.D.*

LABOR AND ITS COMPLICATIONS

Hemorrhages at Time of Childbirth as a Result of Noncoagulability of the Blood (Hémorragies de la déliverance par incoagulabilité). J. GRASSET, J. BRET, P. BONNET, and J. SENEZE. *Bull. Fed. Soc. gyn. obst.*, 1954, 6: 45.

BLEEDING during birth of the child, or immediately following birth, is usually ascribed to uterine inertia. However, the authors report 2 cases in which the uterus was adequately retracted after delivery, but the bleeding continued to endanger the life of the mother. Usually, 2 etiologic factors are ascribed to bleeding at this time: (1) the bleeding following expulsion of the dead fetus in instances of Rh incompatibility, and

(2) that following retroplacental hematoma. In the 2 cases here reported, however, no such causes could be determined.

The first case was that of a 26 year old woman whose third pregnancy had been completed. Following the delivery of twins the uterus failed to retract satisfactorily, despite the intramural injection of 5 units of posterior hypophysin and the simultaneous intramuscular injection of the same preparation in the same dose, combined with 1 c.c. of ergotamine tartrate. The oozing of blood from the genitals could be controlled by the usual measures, including injections of plasma and thrombin. It was finally controlled by a perfusion of 200 c.c. of fresh blood of iso-group type O Rh+.

The second case was that of a 35 year old woman in whom bleeding began towards the end of pregnancy (her sixth). A cesarean section was performed and the operation was completed with the intramural injection of 3 units of the oxytocic. The uterus contracted and became pale; however, the bleeding continued from the deperitonealized abdominal surface and from the entire lower segment of the uterus. Hysterectomy seemed contraindicated. The wound was closed and 55 c.c. of fresh blood and 1,000 c.c. of conserved blood were injected, together with thrombin. The bleeding continued per diapedesis and 36 hours later a hysterectomy was performed. Two hours after the hysterectomy the coagulation time was practically normal. Histologic examination of the removed uterus failed to show any extensive intravascular coagulation (exhaustion of fibrinogen).

An exhaustive study of the blood in these 2 patients showed various possible factors as etiologic agents; the blood findings could not foretell the onset of the condition of noncoagulability and the therapy was not based on the blood findings; nevertheless the authors believe that such exhaustive blood studies should be made in these instances with the hope of decreasing the number of mutilating operations (hysterectomies) in these young women.

On the whole, it is thought that a transfusion of fresh blood may be attempted and the result watched for a short period. If this measure fails, however, the hysterectomy should not be postponed, but should be carried out with the expectation that the lytic substances, or the activating ferments, have originated in the uterus itself, as seems to have been demonstrated in the second case here reported.

—John W. Brennan, M.D.

MISCELLANEOUS

Remote Deaths Following Eclampsia. LEON C. CHESLEY and ROBERT A. COSGROVE. *Obst. Gyn.*, 1954, 4: 165.

ALL BUT 8 of the 270 women surviving eclampsia at the Margaret Hague Maternity Hospital, Jersey City, New Jersey, have been followed up to 1952. Five of the lost 8 were followed up for at least a year. The length of follow-up ranges from 1 to 21 years, and averages almost exactly 13 years.

Nineteen, 7.2 per cent, of the patients died during the follow-up period. Eleven, 58 per cent, of the deaths were associated with cardiovascular renal disturbances.

White women having eclampsia in the first pregnancy and carrying the fetus to viability do not show any increase in the remote annual death rate over that for virtually unselected women of comparable ages. White women having eclampsia as multiparas have a considerably increased remote mortality. This probably depends upon a high incidence of antecedent hypertensive disease. Negro women having eclampsia show a markedly increased remote mortality, as judged from the relatively few cases in our series.

Recurrent toxemia of pregnancy is associated with an increase in the remote annual death rate.

—John R. Wolff, M.D.

GENITOURINARY SURGERY

ADRENAL, KIDNEY, AND URETER

Adrenal Insufficiency as Related to Surgical Shock. ROBERT S. HOTCHKISS and SYDNEY GORDON. *J. Urol.*, Balt., 1954, 72: 577.

ACUTE ADRENAL cortical insufficiency may occur as a serious postoperative complication in patients not previously known to have adrenal disease.

The hypothalamus-pituitary-adrenocortical axis for this neuroendocrine complex is reviewed with consideration of the stress and physiologic reactions that may occur.

Primary changes in acute adrenal insufficiency precipitated by surgical stress are: (1) loss of sodium and chloride from the blood serum and concomitant increase in their concentration in the urine, and (2) decrease in the vascular space with hypotension and oliguria or anuria.

The most common victims of adrenal insufficiency are: (1) those subjected to extensive operations, (2) senile patients with chronic debilitating disease, (3) psychotic individuals, (4) patients previously treated with cortisone or allied substances, and (5) urologic patients.

Urologic patients can precipitate special problems when they have had (1) adrenal damage associated with renal operations, (2) absence of one adrenal gland, and some type of surgical procedure on the opposite kidney, (3) metastatic tumors or tuberculosis in the adrenals, or (4) atrophy of the contralateral adrenal in cases of adrenal tumor.

Various tests for adrenal function and reserve are discussed but it is pointed out that there are no definite means for identifying patients with adequate adrenal activity. It is not safe to assume that normal responses to conventional tests insure sufficient cortical function to cope with the stress of an operation.

When unexplained shock develops postoperatively and does not respond to usual treatment, it is best to treat such patients on the assumption that they have hypoadrenalism. There is little reason to fear that such measures will be injurious even though they may be unnecessary in some cases.

The authors outline a plan for the use of desoxycorticosterone acetate, cortisone, and saline that can be used prophylactically and therapeutically. Eight cases are summarized to illustrate the various patterns of postoperative shock that may occur. In these patients, shock followed a variety of procedures on the urinary tract. Special emphasis is placed on the dangers of postoperative salt deprivation, which, coupled with adrenal exhaustion, may produce an adrenal crisis.—*Ormond S. Culp, M.D.*

Polycythemia and Hypernephroma. JARL FORSSELL. *Acta med. scand.*, 1954, 150: 155.

THE AUTHOR STATES that hypernephroma must be classed among the tumors which cause secondary polycythemia. In support of this contention he describes 4 cases of hypernephroma encountered personally and 4 cases collected from the literature, in which examinations of the blood indicated polycythemia. The author's first case is of particular interest. A 49-year-old man had noted melena in 1943 and hematuria in 1944. In 1945 a diagnosis of polycythemia was made; the erythrocyte count was 8,320,000 and a study of smears of the bone marrow disclosed marked proliferation of erythroblasts. Right nephrectomy was performed for hypernephroma, after which the results of studies of the blood and bone marrow were normal. For the next 14 months the patient remained well and the results of blood studies were interpreted as being normal. At the end of that time his symptoms recurred and a diagnosis of left hypernephroma was made by roentgenographic studies. The erythrocyte count was 7,410,000 and studies of the bone marrow disclosed an abnormally large number of erythroblasts. The patient died in uremia and the diagnosis of hypernephroma was corroborated at autopsy.

The author points out that the blood, plasma, and erythrocyte volumes had not been determined and, therefore, it is possible that the polycythemia was due to reduced plasma volume. The mechanism by which hypernephroma produces polycythemia is a matter for speculation. The neoplasm exerts a direct influence on the blood-forming or blood picture regulating organs. —*Laurence F. Greene, M.D*

Wilms' Tumors in Adults; Four Personal Observations (Les tumeurs du blastème rénal chez l'adulte a propos de 4 observations personnelles). L. FRUHLING, E. BLUM, and Y. LE GAL. *J. urol. méd.*, Par., 1954, 60: 192.

THE AUTHORS briefly review the literature and present 4 cases of Wilms' tumors which occurred in 1 man and 3 women aged 28, 25, 66, and 60, respectively. Such tumors may appear between the ages of 20 and 70, the maximal incidence being between the ages of 50 and 59 years, according to Gleichmann. The fact that 3 women and only 1 man were encountered in this series is contrary to the experience of Gleichmann who found that men were afflicted more frequently than women. Wilms' tumors occurred in more than 2 per cent of 250 renal tumors observed by the authors. The tumors of adults do not differ histologically from those of children. The tumors are radiosensitive in contradistinction to other renal neoplasms.

—*Ernest Bors, M.D.*

Segmental Resections of the Kidney; Experimental Contribution (Le resezioni segmentali del rene; contributo sperimentale). C. BORELLI, G. COLOMBO, and A. GIRARDI. *Arch. ital. urol.*, 1954, 27: 103.

FOURTEEN DOGS formed the experimental material for this study. The purpose of this report is not so much to establish the value of partial resections of the kidney, which is already well established, as to determine if possible which methods of procedure are the most satisfactory.

The animals were divided into four groups. In the first group the upper pole of the left kidney was excised in 4 animals and the lower pole in 4 others. In the second group both the upper and the lower poles were removed. In the third group the central portion of the kidney was resected. In the fourth group a number of resections were carried out: resection of one or the other pole; resection of the intermediate zone of the kidney; and resection of the two poles as a secondary procedure following a preliminary rightsided nephrectomy.

With regard to results, it may be stated in general that all these animals withstood the operation without evidence of detriment to the general health, and there were no abnormal laboratory findings such as might be expected from an insufficient kidney. Even in those animals in which preliminary removal of the right kidney was accomplished before resection there seems to have been an ample renal functional capacity.

The same technique was used in all the animals. The left kidney was exposed from behind, the vascular pedicle was skeletonized, and the arterial branches leading to the segments to be resected were ligated. This ligation caused a change in appearance of the part of the kidney supplied; i.e., a flabby paleness or a cyanotic congestion—either of these changes indicating an insufficient or absent blood supply to the part normally supplied by the ligated arteries. The line of resection was carried along the plane between the part supplied by blood and the ischemic portion. As the calyces were approached the resection was continued under blunt dissection and the calyces were then doubly ligated.

Different methods were employed in the treatment of the raw surface of the kidney left after the resection. In two instances the raw surface was left untreated; in three the surface was covered by a pedunculated muscular flap from the quadratus lumborum and the iliopsoas muscles; in three other animals a fibrinous sponge, medicated with penicillin and sulfonamides, was applied to the raw surface and the whole was then covered by the capsular flap resulting from the resection. The best result was obtained with this last method. The author feared that the muscular flap might produce abnormal tension on the kidney with consequent interference with its blood supply.

In conclusion, the author believes that conservative surgery of the kidney should be resorted to more extensively; that it should be applied to those lesions which, because of their peculiar anatomopathologic character, or because of their initial localization, are limited to a pole, or to the central portion of the kidney. —*John W. Brennan, M.D.*

Antiperistalsis of the Ureter, with Particular Reference to the Bifid Ureter (Sobre el antiperistaltismo del ureter, en especial del ureter bifido). PASCUAL IPIÉNS LACASA. *Arch. espan. urol.*, 1953, 9: 263.

THE AUTHOR PRESENTS 20 cases of bifurcation of the ureter observed in the urologic section of the Provincial Hospital of Nacarra, Pamplona, Spain. In 5 of these cases the main branch of the ureter, or one branch of the two ureters, was catheterized. It was thought that the other branch could have been filled by the opaque substance in a retrograde manner by antiperistalsis since it was of lesser caliber than the one catheterized and joined at an acute angle. In 2 instances the two branches of the ureter probably filled simultaneously, since the catheter did not ascend beyond the immediate level of the bifurcation. In 2 cases one of the branches was catheterized but it was impossible to fill the other branch from the first. In 3 cases it was impossible to reach the point of bifurcation with the catheter. In the remaining cases the diagnosis was made by descending urography.

From his own experience and a study of the available literature, the author concludes that there are evidences of ureteral retroperistalsis in cases of bifid ureter uncovered by ascending pyelography. In at least 3 instances such retroperistalsis has been proved by descending pyelography. In at least 5 specimens removed at operation the author was not able to produce such filling passively.

Thus it is believed that the diagnosis of retroperistalsis or antiperistalsis of the ureteral wall can quite possibly be made without the use of kymography. Urokymography is acknowledged to be the most valuable method for such determination, but the applications and operation of this diagnostic aid are not widely known. In awaiting its universal adoption, satisfactory studies can be made by ordinary urologic methods so long as their limitations are understood. —*John W. Brennan, M.D.*

Ureteral Regeneration: Experimental and Clinical. ROBERT G. WEAVER and JAY H. HENDERSON. *J. Urol.*, Balt., 1954, 72: 350.

REGENERATION of the ureter was studied experimentally and clinically. Longitudinal portions of the ureter were excised in 16 dogs, leaving a narrow bridge of ureter 2 to 3 mm. in width. The ureter was then intubated. Re-examination was done after 2, 3, 4, and 6 weeks postoperatively.

After 2 weeks the ureteral hiatus was covered by a thin mucous membrane. The area of excision was markedly infiltrated with fibrin and inflammatory cells. At this time there was no evidence of muscularis. Three weeks after the initial operation, however, strands of muscle could be seen invading the inflammatory area. Four weeks postoperatively the findings were the same. Six weeks after the operation all the component parts of the ureteral wall had regenerated and there was permanent canalization of the ureter. The regeneration of the ureter in the previously excised area was shown not to be due to a sliding together of the cut ends. These observations suggested that the ureter should be splinted for a minimum of 6 weeks after injury. The regenerated ureter in the dogs functioned normally without stricture formation.

In 8 patients who had strictures of the ureter, the strictured area was incised leaving a bridge of ureter, and in each case the intubated ureter regenerated completely after 7 weeks. An important point in the postoperative care is to keep the area of anastomosis free from urinary leakage.

In a series of 20 cases in which the ureter was splinted and the kidney drained by a nephrostomy tube which was not irrigated, no calcium was deposited in the tube, and satisfactory healing took place in each of the cases. —*S. Richard Muellner, M.D.*

BLADDER, URETHRA, AND PENIS

Abacterial Urethritis; a Report of 8 Cases with Isolation of the Pleuropneumonia-like Organism. WALTER J. HOLLIS. *J. Urol.*, Balt., 1954, 72: 671.

THE QUOTED LITERATURE suggests that at least some instances of nongonococcal urethritis in males are due to pleuropneumonia-like organisms. These organisms also have been isolated from cases complicated further by cystitis, arthritis, bacteriemia, and Reiter's syndrome. They are said to be part of the flora of the female genital tract and to have potentialities of pathogenicity under certain conditions. Evidence, therefore, indicates that such infections are venereal disorders.

The organisms have some characteristics of viruses. Their exact place in bacteriologic classifications has not been established. They are demonstrable in smears only after prolonged staining with Giemsa's stain, require special culture media, exhibit marked pleomorphism, and are sensitive only to streptomycin and high concentrations of aureomycin and chloramphenicol.

Over a period of 27 months the author encountered 179 cases of gonococcal urethritis, 6 cases of nonvenereal urethritis in which the etiology remained unknown, 1 case of urethritis due to Diplococcus paleopneumoniae and Micrococcus pyogenes, and 17 cases of urethritis presumably caused by a pleuropneumonia-like organism (also known as L. organism). All the patients were on active military duty.

Eight of the cases of nongonococcal or abacterial urethritis in which the L. organism was isolated are summarized. In 3 of these there had been antecedent gonococcal urethritis which had subsided. All of the patients were cured by Streptomycin therapy with or without supplementary sulfadiazine. The duration of treatment varied from 3 to 10 days.

It is urged that all cases of urethritis of uncertain etiology be investigated regarding possible isolation of the pleuropneumonia-like organism.

—Ormond S. Culp, M.D.

GENITAL ORGANS

Radical Perineal Prostatectomy for Carcinoma; Analysis of Cases at Johns Hopkins Hospital, 1904–1954. HUGH J. JEWETT. *J. Am. M. Ass.*, 1954, 156: 1039.

THE AUTHOR presents a comprehensive, concise review of the results of radical perineal prostatectomies for carcinoma performed at the Johns Hopkins Hospital, in Baltimore. He points out the fact that the most prevalent carcinoma in the male arises in the prostate gland. The most satisfactory method of discovering this malignancy in an early, curable stage is that of palpation of the prostate by rectal examination. By routine search for the small, relatively incompressible nodule characteristic of carcinoma of the prostate in men over 40 years of age, the Army has been able to discover 54.4 per cent of the prostatic malignancies occurring in its personnel in an operable stage.

Once the disease is suspected, biopsy of the prostatic nodule is indicated. The importance of a biopsy is confirmed by the finding that in the past 5 years, 50 of 91 biopsies of circumscribed nodules indicated the presence of a benign lesion. The advantages afforded by open perineal biopsy when compared to the more indirect methods are discussed. The author points out that perineal biopsy is a relatively benign procedure which was not complicated by either impotence or incontinence in this relatively sizable series.

The long term follow-up in 127 patients subjected to radical perineal prostatectomy for carcinoma is presented. In the group of patients in whom a grossly extraprostatic growth existed prior to operation, there was a 12.5 per cent 10 year survival. In the group of patients in whom preoperative rectal examination failed to disclose evidence of extension of the malignancy, there was a 37 per cent 10 year survival. In the group of patients without microscopic evidence of extension, the 10 year survival rate without evidence of recurrence was 49 per cent. These results compare favorably with a reported 22 per cent 10 year survival in patients treated palliatively for prostatic carcinoma presumed to be localized.

The complications of the radical perineal prostatectomy are discussed. The mortality rate in the last 200 cases was 3 per cent. In the last 100 cases the incidence of incontinence seemed to vary to some extent with the type of vesicourethral anastomosis performed. With the Vest technique (40 cases), 84 per cent of the patients acquired perfect control. With the multiple mattress suture technique (33 cases), 76 per cent acquired perfect control; 21 per cent of the patients in this group had some stress incontinence but in most instances insufficient time had elapsed for final evaluation. With the figure-of-eight posterior suture (19 cases), 95 per cent of the patients acquired almost immediate urinary control. Postoperative stricture occurred at the vesicourethral junction in 15 per cent of the cases; all were easily corrected. Rectal injury occurred in 4 patients but no fistulas have developed. In 3 of these patients primary wound healing occurred.

The author lists the requirements for a satisfactory operative procedure for the eradication of prostatic carcinoma. The perineal approach seems to offer a more satisfactory opportunity for adequate biopsy, complete hemostasis, and watertight anastomosis of the bladder neck and urethra than the retropubic approach.

—John T. Grayhack, M.D.

The Late Results and Sequelae of Prostatectomy. MARCO CAINE. *Brit. J. Urol.*, 1954, 26: 205.

A SERIES OF 748 prostatectomies performed at the St. Peter's and St. Paul's Hospitals, in London, between 1947 and 1950 was reviewed to evaluate the late results and sequelae of prostatectomy. In this group 519 patients were questioned personally and re-examined by the author and these cases form the basis of this report.

Of the 748 patients, 97 had transurethral resection of the gland, 1 was operated on perineally, and the rest were operated upon by one of the many modifications of the suprapubic approach to the gland. For purposes of analysis three types of prostate were recognized: (1) the adenomatous, (2) the fibromuscular, and (3) the fibrous. The criteria as to the type of prostate were based on information derived preoperatively on the findings at the time of operation, and on the report of the pathologist.

Postoperative results. Postoperative symptoms were considered under the following headings: (1) frequency, (2) pain, (3) obstruction, (4) incontinence, and (5) sexual potency after prostatectomy. Frequency was difficult to assay. If the patient voided more than every 1.5 hours by day and more than 3 times at night, he was arbitrarily considered to have urinary frequency. Eight and seven-tenths per cent of the patients examined fell into this category. The fibrous and calculous type of prostate was more commonly associated with persistent postoperative frequency. No particular type of operation per se caused persistent frequency of micturition. Nor was it possible to predict which specific case was prone to postoperative urinary frequency.

Pain. Twenty-three patients had chronic pain. The pain was as follows: (1) urethral pain on micturition, commonly associated with severe urinary infection, (2) spasmodic pain in the tip of the penis (this in one patient who was found to have postoperative bladder neck obstruction and calculi), and (3) pain of vesiculoprostatitis. The latter pain was characterized by aching or burning in the groins, perineum, penis, testis, rectum, over the sacrum, or in the suprapubic region. The patient who had pain of this sort in addition to his obstructive symptoms usually was subjected to prostatectomy because of the obstructive features of his disease. Over 30 per cent of the patients who had pain and obstruction were relieved of their pain.

Obstruction. Thirty-seven patients had symptoms and signs of continuing obstruction. Eight of these patients had postoperative bladder neck obstruction, 13 had a urethral stricture, and in 14 cases recurrent or residual prostatic tissue caused obstruction to the urinary outflow.

Incontinence. Seven of 575 patients had incontinence. Three of these were subjected to transurethral prostatic resection and 1 had a retropubic prostatectomy, but the reason for incontinence in the latter case was not clear.

Sexual activity. Prostatectomy by the suprapubic and transurethral approach did not impair sexual activity.

Bilateral vasotomy as a prophylaxis against epididymitis was justified by the findings of this study. Preoperative and postoperative chemotherapy did not appear to reduce the incidence of epididymitis and, therefore, cannot be relied upon to prevent it.

Postoperative hernia appeared to be less common after transverse suprapubic incisions than after vertical incisions. The size of the incision, moreover, seemed to have some bearing on the incidence of incisional hernia. Thirty-eight and eight-tenths per cent of the patients who had a suprapubic incision of 5 inches or over had an incisional hernia.

Urethral strictures. Sixty-three, or 12.1 per cent, had postoperative urethral strictures, many of which did not give rise to prominent clinical symptoms. The strictures were most commonly located in the proximal portion of the fossa navicularis. It was surprising to find that 21.1 per cent of the patients operated upon by the retropubic method had meatal strictures—this despite the fact that the catheter was kept indwelling for only 4 to 6 days postoperatively, and quite in marked contrast to the low incidence of such strictures (6 to 8 per cent) in patients who had a one or two-stage suprapubic prostatectomy. Twenty-four and one tenth per cent of patients operated on by the cold punch method had urethral strictures, and in those operated on by transurethral resection (Stern-McCarthy resectoscope) the incidence of urethral strictures decreased to 15.5 per cent.

Postoperative bladder neck obstruction. Sixty-five patients developed either a definite stenosis or a diaphragm at the bladder neck. A wedge-shaped excision of the vesical neck at the time of the prostatectomy was a disappointing prophylactic measure against the development of bladder neck obstruction later on. Of 38 patients who had a "V" excision of the vesical neck at the time of the operation, 11.3 per cent nevertheless developed vesical neck contracture later.

Blood urea. In general, the level of the blood urea tended to return to normal after prostatectomy. In a small group of patients (15), however, the blood urea level appeared to rise appreciably higher postoperatively.

Residual urine. A residual urine of 4 ounces or more was found to persist in 33 of 519 patients examined and in 11 of these cases it amounted to more than 10 ounces.

Conclusions. Of 748 patients who had undergone various types of prostatectomy, 519 had been reexamined within a period of 1 to 5 years postoperatively. On the whole the results of prostatectomy were very satisfactory. Eight and seven-tenths per cent of the patients had a persistence of urinary frequency. The retropubic and transvesical methods of prostatectomy gave better symptomatic results than other methods. Transurethral operations were appreciably worse in this respect. Vasotomy was shown to be a worth-while procedure for the prevention of post-prostatectomy epididymitis, antibiotics notwithstanding. The author advocates transverse abdominal incisions to reduce the incidence of postoperative incisional hernias. Urethral stricture and bladder neck obstruction may develop insidiously after the operation and should be looked for since it may not give rise to symptoms disturbing to the patient and cannot be detected by the questionnaire type of follow-up.

—*S. Richard Muellner, M.D.*

SURGERY OF THE BONES, JOINTS, MUSCLES, TENDONS

CONDITIONS OF THE BONES, JOINTS, MUSCLES, TENDONS, ETC.

The Nature of the Bone Changes Associated with Nerve Injuries and Disuse. J. A. GILLESPIE. *J. Bone Surg.*, 1954, 36-B: 464.

THE AUTHOR studied the changes in the bones of kittens and rats with nerve injuries. The bones were subjected to weighing, bending tests, breaking stress, and Young's modulus of elasticity. Section of the anterior nerve root, with or without accompanying lumbar sympathectomy, resulted in a significant reduction in the weight, cortex thickness, and bending moment of the bones in the paralyzed limb. The breaking stress, Young's modulus of elasticity, and the specific gravity of the bone showed no change.

The bones of the group of kittens which were subjected only to posterior nerve root section showed no significant difference between the limbs operated upon and the normal limbs in any of the physical properties considered. The rats whose femoral and sciatic nerves were avulsed showed significant bone changes on the involved side as regards the weight, ash weight, ash percentage, bending moment, breaking stress, and roentgenographic density of the bones when compared with the normal side. Young's modulus of elasticity was unaltered.

The author concludes that the alterations of the characteristics of the bones of the paralyzed limb are due to a loss in the quantity rather than in the quality of bone. The changes that follow paralysis are due to secondary loss of muscular activity, and vascular changes play no part in the atrophy of bone in a paralyzed limb. —*Norman J. Rosenberg, M.D.*

Giant Cell Tumors: Clinical, Roentgenographic, and Anatomopathologic Review of 65 Cases (I tumori a mieloplassi; rassegna clinica, radiografica ed anatomopatologica di 65 casi). C. PAIS and M. CAPPELLIN. *Chir. org. movim.*, 1954, 40: 1.

THE PRESENT report is based on observations made at the Rizzoli Institute, Bologna, Italy. The cases selected for review were those which presented sufficient data to justify their being evaluated at this time, and those in which operations had been performed at least 3 years previously; the reason for the selection of this 3-year control period was that no instance of either recurrence or metastasis occurred in these patients after that period.

The only case reports presented were those in which general involvement had occurred and was followed by the death of the patient. The deaths, however, were not categorically pronounced as due to generalization of the primary neoplastic focus since in none of the six instances could an autopsy be procured, the diagnosis of metastasis being made on the basis of the roentgenologic findings. The authors, nevertheless, accept reports presented in the literature as proof of the fact that these tumors do on rare occasions produce distant metastases and that these metastases may be true metastases of the giant-cell tumor itself and not solely metastasis from a portion of the tumor which has undergone sarcomatous degeneration.

Although the authors do not recommend the roentgenogram as a substitute for the histologic study of the tumor tissues in determining the nature of the neoplasm, they believe that the roentgenologic findings, particularly serial roentgenograms, are of great value in deciding on the type of surgery to be carried out; in this respect the roentgenogram may be more valuable than the histologic findings in the tumor tissues, since these do not always give a true prognosis with regard to the response to surgical treatment. In fact, Figure 39 in the original text is illustrative of a case in which the patient survived for 3 years without recurrence of metastasis. The histopathologic diagnosis was giant-cell sarcoma; cure was obtained by a simple excision and bone implantation in the residual cavity.

The tumors in this series were classified clinically into benign osteoclastomas (56 cases) of which 19 were nonrecurring cases and 37 were recurring, and into malignant or metastasizing tumors (9 cases).

Roentgenologically this material was classified as subperiosteal tumors (51 cases), of which 18 were intracortical and 33 intraperiosteal, and extraperiosteal tumors. There were 14 tumors of the extraperiosteal or infiltrative type.

Histopathologically the material was classified as giant-cell fibromas (52 cases), of which 8 were designated as osteoclastomas with collagenous preponderance (that is, the stromal tissues consisted of a minority of connective cells and a majority of intercellular material [collagen]); and as osteoclastomas with cellular preponderance (44 cases).

Today the surgical indications consist, in general, of excision with osseous implantation in the patients with roentgenographic diagnosis of intracortical osteoclastomas (with the exception of those instances in which the intracortical process is clearly destructive in its development), and resection which is reserved for those patients with intraperiosteal and extraperiosteal processes (and the above mentioned destructive intracortical processes). Amputation of the limb is reserved for the tumors showing marked activity and for cases in which there is recurrence of tumors following resection. With the advent of the newer methods of orthopedic substitutional reconstruction (bone-bank transplants, metallic and acrylic prostheses) resection is being carried out in an increasing number of cases.

The authors have not had a great deal of experience with roentgen therapy; they have employed radiation in a few conditions following operation, without evidence of a great deal of benefit. The substitution of irradiation therapy for surgery was done in only two patients with osteoclastoma of the first cervical vertebra, with excellent results in both cases.

The authors regard the giant-cell tumor as a benign neoplasm, a quality which has been exemplified in the majority of the cases in their material; nevertheless the frequent tendency to recurrence must be consid-

ered, as well as the possibility of malignant transformation. Procrastination in the matter of segmentary resection and immediate amputation—solely for the reason that the histologic preparation presents giant-cells—must not be considered. The roentgenologic findings of extraperiosteal infiltration and the histologic evidence of atypical stromal connective tissues prevent unqualified acceptance of the commonly held viewpoint with regard to the benign character of these neoplasms. —*John W. Brennan, M.D.*

Osteolytic Sarcoma with Giant Cells (Le sarcome ostéolytique à cellules géantes). P. MOULONGUET and R. RONSIN. *J. chir.*, Par., 1954, 70: 669.

AFTER more than a century during which many studies of giant cell tumors of the bones have been carried out, these tumors still are the object of much discussion.

The authors describe the case of a giant-cell tumor (distinguished by pathologic and clinical findings) which they named osteolytic giant-cell sarcoma.

In the present study, giant-cell tumors have been divided into two groups: (a) those which are definitely benign but may degenerate secondarily, often as the result of strong-acting x-ray therapy, and (b) those which are definitely malignant with osteolytic and histologic characteristics, and which could be included in the third group of Lichtenstein's classification.

The authors review the cases appearing in the literature up to the present time. They emphasize the necessity of performing a wide surgical biopsy in all instances in which the condition is suspected. The most frequently involved areas are the distal end of the femur and the proximal epiphysis of the tibia.

The clinical and roentgenologic findings are quite similar to those found in the typical giant-cell tumor. Histologically, the tumor is formed by fusiform, round, and multangular cells of varied shapes and sizes, with atypical nuclei. A great number of pathologic mitoses are present in the cells. The giant cells are particularly small with five or six nuclei in each cell. This type of tumor never produces bone or cartilaginous tissues.

Metastasis occurs frequently, chiefly to the lungs. In 50 per cent of the patients who underwent surgical treatment, the amputation stump was involved. Metastases in other bones of the skeleton are rare.

The authors review 12 published cases in which an osteolytic giant-cell sarcoma developed in patients with Paget's disease; they point out the frequency with which this condition is observed.

—*Carlos Alberto Llorente, M.D.*

Scoliosis in Children. J. I. P. JAMES. *Brit. J. Radiol.*, 1954, 27: 511.

THE AUTHOR presents a general description of the findings and treatment of scoliosis. He believes the prognosis depends not only upon the age at which the scoliosis develops but on the area of the spine as well. He devotes considerable space to a description of the characteristic findings of curves at various levels. The more severe and deforming curves are those at the thoracic region seen in the juvenile and in the adolescent. He describes briefly the method of correction in a Risser jacket and presents some postoperative results. —*Edgar L. Ralston, M.D.*

SURGERY OF THE BONES, JOINTS, MUSCLES, TENDONS, ETC.

Advantages of the Knee Disarticulation Over Amputations Through the Thigh. JOSEPH W. BATCH, AUGUST W. SPITTLER, and JAMES G. MCFADDIN. *J. Bone Surg.*, 1954, 36-A: 921.

BECAUSE MUSCLE and bone are not transected, the spread of infection is minimized and the stump heals rapidly. The largest surface available in the lower extremity is provided for weight-bearing. The stump is firm and insensitive. There is less atrophy of the muscles in the stump than after amputations at a higher level, and, because of this, earlier fitting of a prosthesis is possible. The shape of the stump provides greater balance and stability without rotation than that of stumps in higher amputations. The patient can walk with an excellent gait almost immediately. The prosthesis for such stumps is easy to construct and to fit, requires fewer adjustments, and is superior to prostheses for higher levels of amputation through the thigh. Without a prosthesis the patient can kneel in work or play, bearing weight on the end of the stump in much the same way as the Symes amputee can on his longer stump.

All of the knee-disarticulation stumps have withstood prosthetic wear. These patients were independent economically at an average of 8 weeks after surgery, and all were wearing their prosthesis at work for periods of from 30 to 55 hours per week; they compare favorably with below-the-knee amputees.

The indications for disarticulation at the knee are the same as those for obtaining end-bearing stumps in the thigh. These include congenital anomalies, malignancy, severe trauma, infection of the bone or soft tissues of the leg, septic arthritis of the knee, and an unserviceable below-the-knee amputation stump in which the knee cannot be preserved. Gangrene of the foot and leg is a major indication for knee disarticulation, the only condition being that adequate viable skin must be available for stump closure. Knee disarticulation is the quickest, safest, and least traumatic procedure available.

The article is well illustrated with a detailed description of the operative procedure.

The disarticulation is performed with a tourniquet whenever advisable. A long, broad anterior skin flap, measuring approximately one diameter of the knee from the lower pole of the patella, and a short posterior flap, one-half the diameter of the knee from the level of the superior surface of the tibia, are fashioned, with the lateral limit of the incision at the level of the tibial condyles. The anterior skin incision is deepened through the deep fascia to the bone. The entire anterior flap is then dissected from the tibia and adjacent muscle, the insertion of the patellar tendon and the pes anserinus being included with the flap. The biceps tendon is separated from the fibula; the amputation is completed through the posterior flap; the leg is removed. The patella is not removed and is not allowed to become fixed to the condyles by bony ankylosis; the cartilage is not removed from the condyles or the patella.

The tourniquet is released and all bleeding vessels are clamped and ligated. The patellar tendon is

sutured to the cruciate ligaments and the remnants of the gastrocnemius muscle are sutured into the intercondylar notch. Rubber tissue drains are placed in the wound. The deep fascia and subcutaneous tissues of the anterior and posterior flaps are approximated with No. 00 chromic catgut sutures, and the skin is approximated with continuous locked No. 35 stainless steel wire. —*C. F. Goeringer, M.D.*

Synovectomy Associated with Antibiotics in the Treatment of Tuberculous Synovitis (La sinovectomia asociada a los antibioticos en el tratamiento de la sinovitis tuberculosa). ANTONIO ALZAMORO ALBÉNIZ. *Acta ortop. traumat. iberica*, 1954, 2: 69.

THE ONE FULL case report presented by the author was that of a 15 year old boy who, when 10 years of age, had suffered an attack of pleuritis with febrile attacks. He has since suffered, at times, with a cough. When 13 years of age, the patient began to complain of pains in the knee joint. This knee trouble persisted and a cast was applied a year later. Under this treatment a hydrarthrosis developed with some muscular atrophy (tumeur blanche).

The cast was reapplied and the treatment was accompanied by the administration of streptomycin (20 gm.). The general condition improved, the hydrarthrosis persisting unchanged. Through a U-shaped (Textor) incision, cutting through the patellar ligament, the joint was opened and the thickened synovial tissues were excised. The surfaces were powdered with PAS and the wound was closed. A new cast was applied and the antibiotic treatment was continued.

Six weeks later the cast was removed; the wound had healed perfectly and there was no pain or tenderness; however, movement in the joint was almost totally abolished.

Since then the patient has been continuously at work in a factory and the movement in the knee joint has improved to flexion of about 50 degrees.

Since the operation on this first patient in conjunction with the antibiotic therapy, two other patients have been similarly treated: a 23 year old woman with tuberculosis of the elbow joint, and a 40 year old woman with tuberculosis of the knee joint. The elbow joint inflammation was complicated by bony involvement and, following the synovectomy operation, the healing has been complete, but complicated by a total bony anklyosis of the joint. Synovectomy in the 40 year old woman with a knee lesion has also resulted in healing, and the amount of loss of joint motion is about the same as in the previously reported knee condition. In all these instances the period of treatment has, of course, been markedly shortened by surgery, which factor is considered one of the major advantages of the method.

On the basis of his experience with both the conservative and radical methods of treatment of tuberculous synovitis, the author concludes that conservative measures (immobilization in a cast, antibiotics, etc.) should be adhered to as long as improvement occurs in the general condition of the patient and, particularly, in the local disease. When, however, the local lesion persists and constitutes a threat for the future (danger of generalization), surgery should be considered. —*John W. Brennan, M.D.*

FRACTURES AND DISLOCATIONS

Fracture of the Posterior Arch of the Atlas (Le fratture dell'arco posteriore dell'atlante). I. F. GOIDANICH. *Chir. org. movim.*, 1954, 40: 65.

FRACTURE of the first cervical vertebra is a very rare condition. Putti, reviewing 287 fractures of the spine, found only 6 cases in which the atlas was fractured.

The author makes a careful anatomical description of the upper part of the cervical spine, pointing out the characteristic weakness of the central portion of both, the anterior and posterior arches of the first vertebra.

In almost all the cases fractures are due to a contusion of the skull caused either by a heavy object falling on top of the skull or from impact of the skull against the ground—for instance, in a fall. If the bones of the skull resist the force a fracture of some of the cervical vertebrae may be produced. The atlas, surrounded by soft tissues and well protected under the skull, is not vulnerable as a rule to direct trauma but can be damaged easily by a direct blow on top of the skull. The obliquity of the articular surfaces, according to Jefferson, is an anatomic fact which facilitates the possible fractures of this vertebra. A fracture of the atlas can also be produced if the force hits one side of the skull. Here the condition is different; the direction of the force pulls the vertebra strongly in one direction while the contracted short muscles of the neck pull in the other. In this manner a fracture of the lateral part of the atlas can be produced, usually at the weakest part of the vertebra, the occipital artery groove. This type of fracture can also be associated with dislocation of the atlas or of neighboring cervical vertebrae.

The position of the head at the moment of the accident is an important factor so far as the site of fracture is concerned. If the head is forced in extreme flexion, the posterior arch is more frequently involved while if the head is forced in hyperextension, the anterior arch often is the site of the fracture.

According to Jefferson, fracture of the posterior arch is found in 60 per cent of the cases, of the anterior arch in 16 per cent, and of both anterior and posterior arches in 25 per cent;

If symptoms are present they are related directly to involvement of the nerve structures. If the spinal cord is involved the main problem is the general condition of the patient and the probabilities of surviving are in direct proportion to the extent of the lesion. Fortunately, damage of the spinal cord occurs only rarely.

When the spinal cord remains intact, there is pain (sometimes only tenderness on palpation without any radiation, according to Putti); spasm of the posterior cervical muscles (Jefferson); pain in the posterior wall of the pharynx (Sgrosso); anesthesia and hypesthesia of the territory innervated by Arnold's nerve; and painful movements of the neck.

The diagnosis is easily made roentgenologically. For the anteroposterior view the so-called Fumagalli and Corsieri technique should be used. This method consists of an anteroposterior view of the first two cervical vertebrae through the mouth, opened as far as possible. When it is difficult to open the mouth be-

cause of trismus the author recommends DeQuervain's and Fritzsche's technique of putting a dental film against the posterior wall of the pharynx, or, better, the modification of Fitte and Lagos García who place the film in front of the membranous palate. Fitte and Lagos García also have made anteroposterior films by placing the x-ray tube just under the chin with the direction of the rays making an angle of 40 degrees with the horizontal plane.

The principal complications of such fractures are laceration of the occipital artery, laceration of Arnold's nerve, and laceration of the spinal cord, which are present in almost all cases of dislocation of the first vertebra or where fracture of the odontoid apophysis occurs.

The prognosis of the fracture of the first cervical vertebra is generally good, considering the fact that lesions of the spinal cord are present in only a small percentage of the cases.

Cervical traction followed by a cervical thoracic plaster cast is the usual treatment for this fracture. Surgical treatment should always be secondary and, in general, should be limited to a decompressive laminectomy. *Carlos Alberto Llorente, M.D.*

Experiences with the Steindler Flexorplasty at the Elbow. Leo Mayer and Wallace Green. *J. Bone Surg.*, 1954, 36-A: 775.

Steindler's flexorplasty at the elbow, which consists in the proximal shifting of the muscles springing from the medial epicondyle of the humerus, is indicated when the biceps and brachialis anterior muscles are paralyzed and the epicondylar muscles—the pronator teres, the flexor carpi radialis, the palmaris longus, the flexor digitorum sublimis, the flexor carpi ulnaris—are strong. It is important to test with particular care the flexors carpi radialis and carpi ulnaris, since the palmaris longus may be absent and the action of the flexor digitorum sublimis alone is not adequate to produce satisfactory elbow flexion.

The Steindler operation should not be performed if the fingers are paralyzed, unless their function has been restored by transplantation of the extensor carpi radialis longus and brevis, the extensor carpi ulnaris, or the corresponding flexors of the wrist. Unsuccessful results have usually been due to overestimation of the strength of the epicondylar muscle group.

Other alternative procedures are considered by the authors. Of these, the most important is the Clark transplantation of a portion of the pectoralis major.

In performing the Clark operation, it is obvious that the transplanted strip of pectoralis major must retain its nerve supply intact. If a perpendicular line is let fall from the tip of the coracoid process and the third rib is identified, the nerve to the transplant will be found at their junction as it pierces the pectoralis minor. Of course, a powerful pectoral muscle is essential. In almost none of the authors' cases was this condition met; the thoracohumeral muscles were almost always weak and shoulder arthrodesis was a necessary adjuvant in the rehabilitation of the upper extremity.

A successful operation must conform to the following criteria: (1) the patient must be able to bring his hand to his face; (2) he must be able to do this gracefully, so that his performance does not render him conspicuous; (3) at rest, the arm must hang at the side of the body in a natural relaxed position at an angle of no less than 165 degrees.

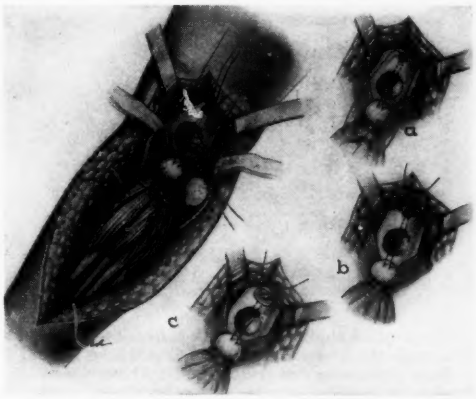
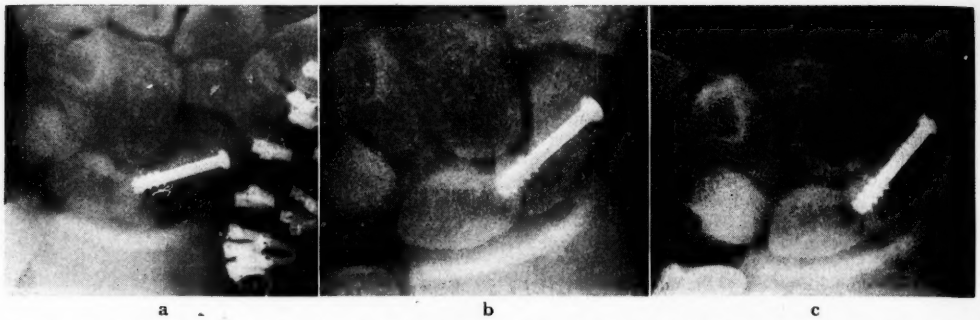


Fig. 1 (Mayer, Green). Showing preparation of the fixation of the muscle tendon transplant to the humerus. A window has been cut in the anterior cortex of the humerus about 5 cm. above the joint, corresponding to the point reached by the transplant when traction is applied during flexion of the elbow. At a point 1.3 cm. proximal to the window, a small drill opening has been made through which the fixation suture is drawn. By traction on this suture while the elbow is held in flexion, the transplant is drawn within the medullary cavity. The suture may be fastened in one of three ways, shown in the insets: a, The ends are passed through the transplant. b, The ends are passed through the periosteum, the paralyzed brachialis anterior, the biceps, and the fascia proximal to the drill opening. c, The ends are passed through a small vitallium button which fits the anterior surface of the humerus at the level of the drill opening. This last method is the simplest and most effective.

If the hand muscles are so extensively paralyzed that function cannot be restored by suitable operative procedures, the Steindler tendon shift is contraindicated. If the medial epicondylar muscles are too weak to flex the elbow when gravity has been eliminated by passive abduction at the shoulder to 90 degrees, the operation should not be attempted. Even if some flexion power is present and this derives solely from the flexor digitorum sublimis, the tendon shift is not likely to be successful, since the patient will be compelled, after the operation, to flex the fingers when trying to flex the elbow. This will interfere with the gracefulness of motion. A flail shoulder is, however, no contraindication, provided the scapular muscles are strong enough to ensure shoulder control following the arthrodesis.

The technique of the Steindler flexorplasty is outlined in detail with excellent accompanying illustrations.

With regard to after treatment, the authors emphasize that when the triceps is completely paralyzed, the immobilization period should be shortened to 2 weeks; otherwise it is very difficult to straighten the elbow. The stretching should be done gently by a



a b c

FIG. 1 (McLaughlin). a, The penalty of an attempt to fix internally an unstable fracture without first transfixing the reduced fragments with a small stiff steel pin. b, Postoperative roentgenogram. Note the level of the fracture. c, Four years after operation, showing bony union and an excellent result. The patient had returned to her job as kitchen helper 2 weeks after operation.

therapist who is accustomed to the postoperative treatment of tendon transplants, and should be combined with exercises to develop the strength of the flexors. From the outset, the patient should be taught to supinate as much as possible. Some pronation is inevitable, but by development of the flexor carpi ulnaris and the extensor pollicis longus (if one is present), this pronating effect of the pronator teres can be partly balanced. After the fourth week, a light turnbuckle brace is worn at night to help straighten the elbow. The authors are not satisfied unless extension to 165 degrees is combined with flexion to 50 degrees.

The timing of the various operations is important. First, the work on the hand should be completed; the most frequent operation in the authors' series has been the Bunnell tendon transplantation for paralysis of the opposing muscles of the thumb. Arthrodesis of the wrist has enhanced the effectiveness of the flexorplasty in selected cases. The Steindler flexorplasty or its equivalent should be performed next. Finally, when adequate elbow function has been secured, arthrodesis of the shoulder is performed.

The operation can be performed at any age, provided the patient is old enough to co-operate in the after treatment. The youngest patient in the present series was 4 years old; she secured an excellent result. The oldest patient was 32 years old.

—*C. Fred Goeringer, M.D.*

Fracture of the Carpal Navicular "Scaphoid" Bone; Some Observations Based on Treatment by Open Reduction and Internal Fixation. HARRISON L. MCLAUGHLIN. *J. Bone Surg.*, 1954, 36-A: 765.

IN DEVELOPING a new operative technique for the treatment of fractures of the carpal navicular bone, the author hoped to overcome the long period of immobilization during which healing is required. The procedure was accomplished in 19 fractures of the carpal navicular bone over a 9 year period. Acceptable indications included: (1) a justifiable reason for obviating the penalties of prolonged plaster immobilization; (2) fracture with displacement or instability at any level; (3) a fracture without displacement through or proximal to the waist of the navicular; (4) a symptomatic ununited fracture without a vascular necrosis or arthritis.

A description of the operation, with excellent illustrations, is given.

Five patients with ununited fractures received late internal fixation. All had remained untreated prior to operation. In each, the ununited fracture constituted a major disability, sufficient to prevent work. The rapidity of return to regular work following operative fixation and the ease and comfort with which all of these patients have continued to carry out their normal duties have been surprising, especially since to date none have shown any definite evidence of bone healing. It seems improbable at this late date that bony union will even occur. However, sclerosis has not progressed at the edges of the ununited fracture, but, on the contrary, it has consistently regressed with time and use.

Five patients with stable fractures were treated by early internal fixation. The technical problems of fixation were simple, and a rapid resumption of normal activities was the rule. As might be anticipated from the nature of the lesion encountered, uneventful bony union occurred in all cases.

Nine patients with unstable fractures received early internal fixation. Two of these cases are too recent for evaluation. In 7 patients, the postoperative clinical course was as satisfactory as for the patients with the stable fractures.

The prognosis for any fracture of the carpal navicular may depend as much upon the intrinsic stability of the fragments as upon the level of the fracture, or the vascular status of the proximal fragment. The morbidity of fractures of the carpal navicular is reduced greatly by internal fixation. Rapid relief of symptoms and return of function follow stabilization of an ununited navicular fracture by internal fixation, but bone healing is not to be expected following this procedure alone. —*C. Fred Goeringer, M.D.*

Fractures of the Carpal Navicular (Scaphoid); a Report of 436 Cases. MARCUS J. STEWART. *J. Bone Surg.*, 1954, 36-A: 998.

IF A FRACTURE of the carpal navicular is accurately reduced and adequately immobilized for a sufficient

time, solid bony union may be expected. Failure to diagnose, to reduce, and to immobilize these cases properly is directly responsible for delayed union or nonunion. In delayed treatment, the presence of vacuolation or cystic change is not considered discouraging. When the fracture has been properly immobilized, the healing which takes place in the cystic area will include the fracture line. If the proximal fragment is viable, sclerosis at the site of the fracture is no contraindication to prolonged immobilization. As a rule, after 2 or 3 months of uninterrupted immobilization, decalcification of the sclerosis will be observed, signs of union will follow, and ultimately solid bony union will take place.

In adequately immobilized fresh fractures, the development of avascular sclerosis in the proximal fragment is no contraindication to continued nonoperative treatment. In the majority of cases, the fracture will unite and the proximal fragment will be revascularized. The wrist must be protected until revascularization is complete.

Rarely will normal function of the wrist be obtained following excision. Bone grafting or drilling will not, except in an occasional case, offer any better prospect of union, nor will they, as a rule, reduce the average period of disability.

In the occasional fracture with excessive displacement of the proximal third, early excision of the proximal fragment is recommended, unless accurate reduction can be obtained by manipulation.

The type of plaster cast described ensures adequate immobilization of the navicular and allows the patient excellent use of the hand.

The author observed 436 fractures of the carpal navicular. Of these, 11 were incomplete fractures in the distal third; all healed without delay. Three were bipartite fractures of the scaphoid with associated sprain. The other 422 cases form the subject of this review. The majority of the fractures (323) were fresh or acute injuries which were diagnosed immediately or within a period of one month. The remaining 99 were old fractures, the average period of time which had elapsed before the diagnoses were made being 38 weeks.

Of the 323 patients with fresh fractures, 320 were treated only by immobilization in plaster. Of this group, 258 patients obtained solid bony union with restoration of full function in the wrist and hand. They had an excellent range of painless motion, no point tenderness, a normal grip, and normal strength in the wrist. Therefore, 303 (approximately 95%) of the 320 patients treated by plaster immobilization obtained excellent or good results.

Three of the 323 patients were treated by early excision of the proximal fragment; all obtained good results.

In 41 patients, mild to marked vacuolation or cystic changes were apparent at the site of fracture; an average of 16 weeks in plaster was necessary for the group. Despite early diagnosis and adequate immobilization, avascular sclerosis developed in 22 (8.5%) of the 258 patients who obtained bony union and excellent results.

Of the 91 patients with old fractures, 90 were treated by immobilization only.

Collectively, the 51 fractures were immobilized for an average period of 20 weeks. In contrast, an average period of 12 weeks of immobilization was required for fresh fractures. Thus, an average of 8 additional weeks in plaster was made necessary by the delay in diagnosis.

The remaining 9 patients were treated by surgery—5 by autogenous bone grafts, 2 by excision of the proximal fragment, and 2 by multiple drilling.

In one of the patients, treated by the application of a bone graft, the graft resorbed and the fracture failed to unite. —*C. Fred Goeringer, M.D.*

ORTHOPEDICS IN GENERAL

The Influence of Inactivity, With or Without Injury, on the Weight and Biochemistry of the Bones of Normal and Castrated Rats (Les répercussions pondérales et biochimiques de l'inactivité, simple ou combinée à un traumatisme, sur l'os du rat normal et castré). RENÉ FONTAINE, PAUL MANDEL, JEAN-NICOLAS MULLER, ABEL SIBILLY, and JACQUELINE BURCKARD. *J. chir.*, Par., 1954, 70: 797.

THE AUTHORS STUDIED the biochemical changes occurring in the bone tissue of the extremities of rats after immobilization. When the hind legs of normal and castrated rats were immobilized by a plaster cast for a period of 2½ months, they found an *increase* of the weight of the dissected tibia amounting to 4 per cent in males, 20 per cent in castrated males, 17 per cent in females, and 25 per cent in castrated females. The calcium-phosphorus, calcium-nitrogen and phosphorus-nitrogen content of the dried bone tissue was equal per gram weight when compared to the bones of control animals. Further experiments proved that water absorption only partially explained this weight increase.

To find out whether these changes were not caused by compression by the cast, other methods of immobilization were used. The changes that occurred after sectioning the Achilles tendon were not significant. After section of the sciatic nerve the weight of the tibia decreased to an amount of 6.6 per cent. Normal calcium, phosphorus and nitrogen contents were found. Traumatizing the extremities before immobilization in a plaster cast caused a further increase of the weight of the tibia, and a decrease of 5 per cent of the calcium and phosphorus contents with no change in the nitrogen content.

In a final experiment, the authors crushed the legs which had been previously paralyzed by sciatic nerve section. They found a 5 per cent loss in the weight of the femur, and a 6 per cent increase in the weight of the tibia. There was some decrease in the phosphorus content of the dried bone.

The authors reached the following conclusions: (a) plaster immobilization is followed by an increase of weight of the distal segment of the limb; (b) this increase can only partially be explained by water absorption; (c) castration seems to cause a greater increase; (d) sciatic nerve section causes a decrease in the weight of the bone; (e) immobilization after traumatizing the tissues further increases the weight but demineralizes the bone tissue.

—*Joseph C. Mulier, M.D.*

Intensive Physical Therapy Aided by Curare in the Orthopedic Treatment of Poliomyelitis. VICTOR H. RAISMAN and FREDERICK COURTEN. *Acta orthop. scand.*, 1954, 24: 62.

UNTIL RECENTLY in the United States, the orthodox treatment of poliomyelitis was based on the theory that if a muscle were weakened or paralyzed, its unresisted normal antagonist would pull the part into a deformed attitude. New studies show that the overpulling muscle is not normal but is subject to increased irritability. This condition was labelled "muscle spasm" by Elizabeth Kenny.

Following the work of Schwartz, Ransohoff showed that most, if not all, skeletal muscles of the body demonstrate abnormal action currents in acute poliomyelitis. After administration of curare aided by intensive stretching, the abnormal currents were diminished or obliterated and the disproportion in activity of the muscles and their antagonists did not occur.

Involuntary muscle shortening is a constant finding in the acute stage of poliomyelitis. Maintenance of normal muscle length has always been known to be important. For example, the purpose of lengthening the Achilles tendon by tenotomy is not only to correct the deformity but also to stop the overstretching of its antagonists. If the tendency to shorten is overcome by stretching aided by curare, normal muscle length will be re-established and can be maintained as long as stretching is continued. This means absence of contractures and the elimination of operations for their correction.

Stretching is a logical and already tested method for lengthening muscles in poliomyelitis. The standards for stretching may seem excessive, but (in the author's belief and from his experience) must be employed. Follow-up studies for several years reveal no damage to muscles. As soon as stretching was neglected the muscles began to tighten up to the range within which the patient used them. Curare is employed until the standards for normal muscle length have been attained. It is most desirable to carry out the treatment of poliomyelitis in a hospital. Dosage, safeguards, and precautions in the use of curare are discussed at length.

When complete relaxation has been obtained through the early phase of treatment, other types of therapy are employed, viz., exercise, electrical stimulation, muscle re-education, and progressive assistive or resistive exercises; however, persistent stretching for the rest of the patient's life is desirable. Devoting 15 minutes each day to prescribed exercises is after all a small price to pay for avoidance of deformity and/or possible corrective surgery and braces.

—*Kenneth E. Sherman, M.D.*

SURGERY OF THE BLOOD AND LYMPH SYSTEMS

BLOOD VESSELS

Composite Venofascial Autografts; Creation and Employment; an Experimental Study. NEWTON CHUN, RICHARD FORNEY, and EGBERT H. FELL. *J. Thorac. Surg.*, 1954, 28: 281.

WITH THE current extension of the therapeutic scope of vascular surgery, the limited availability of satisfactory grafts for replacement in major arteries becomes a matter of considerable importance. Because of tissue survival and the low incidence of degeneration in experimental autogenous vascular grafts, native grafts are desirable, but the indispensability of the human arterial tree limits the source of workable autologous tissue tubes. In the belief that one could make a large caliber graft from small veins properly supported so that it would not undergo dilatation, and with the added advantages of availability and autogenicity, the authors undertook a series of experiments in an attempt to fashion such grafts from veins within the host.

Eighteen to 30 pound dogs were employed and venous segments from the same animal supported by fascia from the fascia lata, lumbodorsal fascia, fascia of the external oblique aponeurosis, and from the rectus abdominis aponeurosis were used. External jugular vein segments were implanted at the above sites. These segments of jugular vein measured from 6 to 8 cm. in length, and they were sewn as rectangles on the fascia in eight experiments. In 9 to 24 days re-examination of these sites disclosed serouslike cavities with smooth, glistening surfaces. Futher experiments were then performed in which freshly sutured venous segments were placed on fascia and were wrapped together around nonreacting plastic stents with the blood supply to the fascial pedicle maintained at either end of such tubes. These tissue tubes with stents were left in situ for periods ranging from 7 to 52 days. Nineteen such venofascial tubes were recovered and transplanted as autografts into the thoracic and abdominal aorta for periods of 2 to 156 days, after which aortograms were taken and the animal sacrificed. A few days after aortic transfer the graft is surrounded by vascular granulations, and the surface is coated with a thin, fibrous layer. Reconstruction and resurfacing of the graft procedes centripetally from the junctional host tissue at the anastomotic lines and endothelialization becomes evident at 3 weeks. The proliferating aortic endothelium eventually completely relines the graft. The original fascia and the fibroelastic venous layer survive. In one graft there was slight dilatation, in three grafts focal hyaline deposits were found at 35, 37, and 70 days, and one graft showed microscopic calcific deposits at 70 days.

In this study the survival and persistence of the venous and fascial elements and the low incidence of degenerative changes were promising as to long-term prognosis. The venous intima is replaced by a fibroserous lining which in turn is replaced by aortic endothelium. —*Allan D. Callow, M.D.*

Neurologic Damages in Disturbances of Peripheral Circulation (Neurologische Ausfaelle bei peripheren Durchblutungsstoerungen). H. BERGHAUS and H. FELTEN. *Langenbecks Arch. u. Deut. Zschr. Chir.*, 1954, 278: 434.

THE AUTHORS REVIEW the literature dealing with neurologic changes which accompany peripheral vascular diseases, and report on a series of 25 patients who suffered either from endangiitis obliterans or obliterating arteriosclerosis. All of the patients showed intermittent claudication of varying severity.

The patients were examined by oscillography and serial arteriography; where necessary, aortography too was done. At the same time a complete neurologic examination was carried out in order to reveal changes in sensibility accompanying the vascular disturbance.

Some degree of hypesthesia was found in an overwhelming majority of all cases in which obliteration of the arteries was demonstrated by angiography. The degree and extent of the sensory disturbance were in direct proportion to the site and completeness of the obliteration. The area of the sensory lesions did not coincide with the area innervated by certain peripheral nerves, nor with the boundaries of dermatomes; rather, there was a diffuse lowering of sensitivity, most marked in the distal portions and gradually improving in the proximal direction, corresponding roughly to the area supplied by the obliterated blood vessels. While all qualities of sensibility were involved, the sense of temperature proved to be affected in a higher degree than the other qualities.

The writers assume that the disturbance is due to chronic hypoxia of the sensory end organs in the periphery. —*Werner M. Solmitz, M.D.*

Arterial Shunts; a Technique for Replacing Segments of Large Vessels. HOWARD MAHORNER and ROWENA SPENCER. *Angiology*, 1954, 5: 294.

THE AUTHORS have been engaged in developing a means of keeping blood circulating through the aorta while a graft was being inserted. The purpose is to obviate the dangers of cardiac, renal, or neurologic complications which threaten prolonged aortic cross-clamping. In working with dogs, the technique of using a temporary polythene tube shunt to maintain blood flow during segmental replacement of the aorta was found to be disappointing. Difficulty was experienced in closure (without constriction of the lumen) of the stab wounds in the aorta after the tube was removed, or hemorrhage resulted from tearing out of the sutures. The authors have devised a new technique, in which a reconstituted frozen homologous aortic segment is used as a shunt graft, applied as two end-to-side anastomoses while the aorta is only partly occluded by clamps.

Short abstracts of 12 cases of aneurysms of the large vessels are appended. In 2 of the patients, segments of larger vessels including the aneurysms were replaced by homologous grafts, with good results. The homologous graft shunt technique was used. The

authors suggest that this method is a practical solution to the problem of placing segments at high levels in the aorta. —*Edwin J. Pulaski, M.D.*

Maintaining Sterility During Storage of Arterial Homografts. J. D. MORTENSEN, LYLE A. WEED, and JOHN H. GRINDLAY. *J. Laborat. Clin. M.*, 1954, 44: 604.

PRESERVED SEGMENTS of aorta or major arteries which have been removed from suitable donors within a few hours after death may be used as arterial grafts. These grafts must be sterile at the time of implantation, otherwise abscess formation, necrosis, and hemorrhage are likely to occur. Even if fatal hemorrhage were avoided and infection controlled, subsequent fibrosis would be likely to cause constrictive narrowing of the graft.

To assure sterility of a homograft the graft must be sterile when it is placed in storage, and it must be preserved from contamination during the storage period. Because of these considerations, it has become standard practice in most arterial banks to place an antibacterial agent in the solution in which the graft is washed when it is first obtained, and also in the storage medium. The usual agents are penicillin, 100 units per cubic centimeter, and streptomycin, 0.1 mgm. per 100 c.c. Although the authors are not aware of reports of unfavorable effects from the use of these antibiotics, the following objections might be raised:

Neither penicillin nor streptomycin is fully effective against all organisms; both penicillin and streptomycin deteriorate rather rapidly in solutions of the concentrations commonly used, and the rather rapid and continuing emergence of strains of common contaminating bacteria which are resistant to penicillin and streptomycin, either or both, is a source of concern, since contamination of the graft with such organisms would not be eradicated by these antibiotics in the storage medium. Furthermore, a clinical infection resulting from implantation of such a contaminated graft would not respond to administration of these antibiotics. This objection alone seemed to the authors a potent argument against the use of penicillin and streptomycin as bacterial inhibitors in arterial homograft banks.

Published reports indicated that a dilute, aqueous solution of merthiolate (sodium ethylmercurithiosalicylate) might prove an acceptable agent for maintaining sterility in arterial homograft banks. The authors used this agent in their experimental arterial homograft bank and found a buffered solution of merthiolate, in a concentration of 1 in 1,000, to be a safe, efficient, and satisfactory decontaminating agent for use in solutions employed in arterial homograft banks. For this purpose it had certain theoretic and practical advantages over the more commonly used penicillin and streptomycin. However, it could not be relied upon to sterilize grossly contaminated arterial segments; rather, it was used in a prophylactic manner, to maintain sterility of grafts obtained under the most favorable aseptic conditions.

The Fate of Heterologous Arterial Grafts; An Experimental Study. OSCAR CREECH, JR., MICHAEL E. DE BAKEY, MILTON SELF, and BÉLA HALPERT. *Surgery*, 1954, 36: 431.

THE AUTHORS STUDIED the changes that occurred following implantation of arteries from slaughtered hogs. sheep, and calves into the dog. Preliminary studies revealed that because of variation in thickness of the blood vessels of the sheep and the calves, the blood vessels from the hogs were found to be more suitable for implantation into the dog. For this reason, only one sheep artery and three calf arteries were studied, all others being grafts taken from hogs. Following removal of the vessels from the animals, the vessels were washed with physiologic saline containing penicillin and streptomycin, and then the blood vessel segments were preserved in two ways: (1) fixation with 4 per cent neutral formalin, and (2) by freeze-drying. The blood vessels were transplanted into the carotid arteries, thoracic aorta, and abdominal aorta of dogs. Anastomosis was accomplished by a simple continuous suture with No. 00000 arterial silk. All animals received 300,000 units of penicillin daily for 5 to 7 days. The results were as follows:

Formalin-fixed grafts were inserted into the carotid artery in 14 dogs, the thoracic aorta in 8, and the abdominal aorta in 2. Of the 44 dogs, 18 survived for less than 1 month, graft failure accounting for 4 of these deaths. Of the remaining 26 animals, 5 died 7 to 29 months after operation from causes unrelated to the graft, 20 were sacrificed, and 1 animal was living at the time of the present report, 31 months postoperatively.

Of the 12 dogs receiving freeze-dry heterologous grafts implanted into the abdominal aorta, 4 survived less than 1 month, graft failure being responsible for the brief survival in 2 of these; 1 died 13 months postoperatively from rupture of an aneurysm in the graft; 5 were sacrificed; and 2 were alive 20 and 21 months after operation. In dogs surviving for more than 1 month, the condition of the grafts was determined by arteriography or at necropsy. Of the 26 animals in which formalin grafts were inserted, and with survival, 11 were patent and 15 were occluded. Five of the patent grafts were dilated. Of the 8 freeze-dry grafts, 7 were patent, and 1 was occluded by a thrombus. Four of the patent grafts were dilated.

Detailed histologic studies were carried out on all specimens, and the authors observed that, in general, the fate of heterografts is that of gradual deterioration rather than replacement and restoration. Dilatation of the heterografts was seen in one-half of all those which were older than 18 months.

The authors have utilized a freeze-dry hog's artery to bridge a defect created by resection of an external iliac artery in a patient with carcinoma. Arteriography 5 months subsequently disclosed a dilatation of the graft to twice its former size. Seven months after the operation, at autopsy, the graft was found to be dilated and occluded by a recent thrombus.

—*Yoshio Sako, M.D.*

SURGICAL TECHNIQUE

ANTISEPTIC SURGERY; TREATMENT OF WOUNDS AND INFECTIONS

Artificial Solutions for Infusion in the Treatment of Burn Shock (Kuenstliche Infusionsloesungen in der Therapie des Verbrennungsschocks). H. W. SCHEGA. *Chirurg*, 1954, 25: 396.

THE AUTHOR states that the reduction in mortality from severe burns has been reduced to one-seventh of what it was before World War I, and that casualties with up to 70 per cent of body surface burns are sometimes saved. This is due to our increased knowledge of water, electrolyte, and protein behaviors, not to improvements in local therapy. Burn shock is due to oligemia. With the aid of diagrams with which we are all familiar it is pointed out that in shock from these causes, e.g., hemorrhage, the body can combat oligemia and, hence, shock by peripheral vasoconstriction, and by the inflow of fluid from the interstitial spaces into the blood stream. These two mechanisms depend, however, upon intact capillary walls. Due to the action of toxins (unknown protein breakdown products) the capillaries are damaged in burns and the protective mechanisms do not work, and indeed the damaged walls allow protein to escape into the tissue spaces, compounding the oligemia by loss of the blood stream of its relative osmotic pull.

Treatment of shock means correction of oligemia. Debate in the international literature centers around the use of crystaloid versus colloidal solutions. The author carried out extensive experimental work on animals, although the details are reported elsewhere. He concludes here that noncolloidal infusion solutions leave the circulation almost immediately in the case of burn shock, taking protein with them, thereby not helping the oligemia and at the same time aggravating the edema. This edema fluid, in being mobilized days later, overburdens the heart, lungs, and kidneys.

The author emphasizes that *noncolloidal solutions are absolutely contraindicated in the treatment of burn shock*. He uses plasma, human albumin, and plasma volume expanders, and seems to favor plasma over whole blood. If additional salt is needed it is given preferably by mouth, but occasionally by clysis, in which case hyaluronidase has been added. Rutin and antihistaminics are given to help restore the normal capillary permeability.

Schega refers to the literature, including our recognized authorities on the subject, rather extensively. Some of these authorities will not agree with his conclusions. —*Robert C. Combs, M.D.*

Postoperative Wound Infections Due to Staphylococcus Aureus. CHESTER W. HOWE. *N. England J. M.*, 1954, 251: 411.

THE PRESENT REPORT deals with the incidence of postoperative sepsis in so-called clean wounds and with the staphylococcal carrier rate in hospital patients and personnel.

Reports from various laboratories throughout the world bear out the fact that penicillin-resistant strains of coagulase-positive hemolytic Staphylococcus aureus recovered from hospitalized patients have increased since the introduction of penicillin in 1941. Earlier reports indicated that resistant strains were found in only about 10 to 15 per cent of those tested, whereas more recent studies show that 50 to 75 per cent of staphylococci from various clinics are penicillin-resistant.

There are a number of articles in the literature concerning therapeutic failures as a result of infection with penicillin-resistant Staphylococcus aureus, but these reports are as yet few in view of what might be anticipated from emphasis on the laboratory findings. Various mechanisms have been postulated for the development of resistance, but most investigators have stressed the fact that all resistant strains of staphylococci isolated from their patients have been penicillinase producers. This type of resistance is not an acquired characteristic. Recent studies, which have included bacteriophage typing of strains, indicate that the widespread use of penicillin has reduced the number of sensitive strains and allowed penicillinase-producing staphylococci to flourish and become predominant. These resistant strains are then disseminated from patients to carriers and thence to other patients. Spread probably occurs largely by personal contact, but air and dust have been recovered containing resistant staphylococci in clinic wards, the number of organisms recovered correlating roughly with the amounts of antibiotics used on a given ward.

There has evidently been a change in the type of bacterial population, rather than an actual development of resistance under treatment in most cases so that penicillinase-producing staphylococci, formerly in the minority, have now become predominant in certain areas. It appears that to maintain a high incidence of resistant strains among carriers, a large number of patients must be receiving the drug. This condition is fulfilled on a surgical service where many patients are receiving penicillin, the most commonly used antibiotic, therapeutically and prophylactically.

It is apparent that this increase in the number of resistant strains is observed primarily in hospitals. This is attested by the following facts; the greatest prevalence of resistant organisms is found in hospital patients, among whom penicillin is most heavily used; the number of resistant strains isolated from outpatients is roughly half that isolated from inpatients; and present information does not indicate that naturally occurring staphylococci carried by the population at large are frequently resistant to penicillin. It is also apparent from recent studies that staphylococcal resistance, whatever the mechanism may be, is likely to develop with other antibiotics than penicillin and that the development of resistance to a drug is roughly in proportion to its use in a given area.

The author presents statistics compiled from a review of all operations performed during the years 1949

to 1953 on the surgical service, both house cases and private cases. The operations were classified according to the amount of chance for infection that was to be anticipated. In the first group, clean operations such as herniorrhaphies, mastectomies, and sympathectomies were included. In the second group, operations in which there was a potential contaminant, but in which the wounds were generally anticipated to be clean, were placed; these included cholecystectomy, intestinal resection, perineal surgery, and skin grafting procedures. The third group was for operations in which sepsis was expected, such as drainage of an abscess. The fourth group included those procedures which did not involve incisions such as reduction of a fracture or endoscopy. Data are presented showing that the rate of infection of clean wounds after operations (at the Massachusetts Memorial Hospital) has gradually increased in a stepwise, statistically significant fashion over the past 5 years despite the prophylactic use of antibiotics.

It is known that the nose and nasopharynx are the chief reservoirs of virulent staphylococci and that nasal carriers or patients with open wounds containing this organism also carry it on the skin very frequently. The patients and personnel in one ward and in the operating room were chosen as a sample cross-section on which to perform a cursory check of the hospital carrier rate of Staphylococcus aureus. In August, 1953, cultures were performed on all patients, house officers, nurses, orderlies, dietitians, clerks, messengers, and all persons working in the selected areas on both day and night shifts. Swabs wet with beef-heart infusion broth, enriched with sheep's blood and fortified with para-aminobenzoic acid were used to culture the nose and nasopharynx, and another swab was drawn across the length of the hand and down each finger—that is, five times each on both dorsal and palmar surfaces of the hand. The cultures were planted in beef broth and on blood-agar plates.

All floras were tested for sensitivity by means of antibiotic discs containing one unit of penicillin. The discs were placed on blood-agar plates freshly inoculated directly from the culture swabs, and the zones of inhibition were interpreted after 24 hours' incubation at 37 degrees C. Particular attention was given to the size of the inoculum. If the plate did not present a solid sheet of growth the test was repeated with a heavy inoculum. Pure subcultures of staphylococci were made for sensitivity testing in a few cases, when necessary, because of the presence of other bacteria. Organisms with zones of inhibition of 11 mm. or less in diameter were considered resistant to penicillin. All others were considered penicillin-susceptible for the purposes of this survey.

In this fashion, 88 personnel and 37 patients were cultured. Of these, 124 (99.2 per cent) carried Staphylococcus aureus either in the nose or nasopharynx or on the skin, and the majority had the organisms in both areas. Since the nose and nasopharynx are the most important reservoirs the organisms recovered from nasal cultures were subjected to penicillin sensitivity tests. Of 116 strains, 91 (78.5 per cent) proved to be penicillin resistant. The highest incidence of heavy growth occurred in personnel having most intimate contact with patients, namely, nurses, nurse's aides, and attendants. Doctors were next in frequency, and personnel having relatively little actual patient contact demonstrated lighter growth on culture. Anesthetists yielded uniformly heavy growth.

Analysis of the hospital carrier rate and bacterial flora of infected wounds strongly suggests that this increase in postoperative sepsis is due to an abnormally high penicillin-resistant carrier rate in hospital personnel and patients as a result of the widespread use of penicillin. These findings are in keeping with the recognized trend toward increase in the number of penicillin-resistant staphylococci being reported and the clinical and therapeutic problems that result from it in the field of medical infections. The serious physical and financial burdens imposed on patients who contract major postoperative sepsis merit continued study. —*Matthew H. Evoy, M.D.*

ANESTHESIA

The Effect of Atropine and Scopolamine on the Subsequent Injection of Epinephrine in Thyrotoxic and Euthyroid Patients. STANLEY J. SARNOFF and OLIVER COPE. *Anesthesiology*, 1954, 15: 484.

NUMEROUS studies have demonstrated the increased response to the administration of epinephrine in the experimental animal given thyroxin. It has also been shown that when atropine is given prior to the administration of epinephrine, the latter produces a greater effect on the pulse rate and blood pressure than would otherwise occur. In the year before this study, 4 thyrotoxic patients whose basal metabolic rates had been brought to normal or near normal levels, exhibited a reaction of appreciable proportion during operation. Each had received atropine as a premedication. It was thought worth while to ascertain whether or not a given dose of epinephrine produces a more marked effect after atropine has been administered. Therefore, 5 thyrotoxic and 9 nonthyrotoxic patients were given epinephrine subcutaneously or (in some cases) intravenously, and variations in blood pressure and pulse rate were noted. These findings were compared with those in patients who were given atropine first, and then epinephrine. The comparison was also made with the effect of atropine and scopolamine given prior to the administration of epinephrine.

It was seen that the preliminary injection of atropine sulfate, in doses commonly used clinically as preoperative medication, augments the effect of subsequently administered epinephrine hydrochloride. This is true of the thyrotoxic as well as the normal patient.

The augmented effect is evidenced by a higher and more prolonged rise in pulse rate and systolic pressure, and by an increase in subjective distress and muscular tremor in the thyrotoxic patient.

The effect is independent of the route of administration used for either drug.

Inasmuch as the pulse rate and blood pressure are important criteria in evaluating the operative course of thyrotoxic patients, it seems unwise to distort these values by the administration of atropine. Scopolamine may produce the same type of augmentation but in these patients did so less often and to a lesser degree. It has an additional advantage of being effective as a drying agent in smaller doses.

—*Edmund R. Donoghue, M.D.*

SURGICAL INSTRUMENTS AND APPARATUS

The Skin Dermis Graft as an Alternative to the Direct or Tubed Flap. WILFRED HYNES. *Brit. J. Plast. Surg.*, 1954, 7: 97.

THE SKIN dermis graft is proposed as a substitute for the more complicated direct or tubed pedicle flaps which necessitate multiple operations over a long period of time, and may involve acrobatic positions, and which are susceptible to complications such as necrosis due to failure of circulation, or hematoma. This technique provides, by means of a free graft, a skin cover containing a layer of dermis as thick as, or thicker than, the ordinary full thickness Wolfe graft. The author has named this a dermis skin graft as it consists of two main layers, a thick split-skin graft, and an equally thick layer of dermis with a small quantity of fat between them. It has been used to replace unstable scars of the lower limb adherent to underlying sclerosed bone instead of a cross-leg flap or abdominal tubed pedicle.

The method as applied to such a lesion consists of a series of three operations. The scar is excised and sclerotic bone is chiselled away until bleeding bone is encountered; dressings are applied and the wound is encouraged to granulate, which takes approximately 3 weeks. At this time, a thin split-skin graft is taken from the thigh, and saved. The dermis thus exposed and the underlying skin layer of fat is next removed by knife dissection, and the donor site is closed by a skin graft from the opposite thigh. With scissors, most of the fat is removed from the deep surface of the dermis showing the pits and allowing tiny scattered clumps of fat to remain. This thick dermis graft is applied to the original lesion in a reversed position, with the superficial surface opposed to the granulation tissue. The deep pitted surface is now superficial and this is covered in turn by the thin split graft which was just taken and which is sacrificed as a physiological dressing. A pressure dressing is applied and the wound is dressed 7 days later. As a rule, the dermal graft takes well; the split skin graft is lost. Saline dressings are now applied for 3 to 4 days until granulation tissue begins to appear in the dermal pits, whereupon the patient is ready for the last operation which consists of the application of a thick split-skin graft. Upon taking, the cover will now consist of a thick deep layer of dermis and a more superficial split-skin graft with a scanty layer of fat between them. Occasionally, the physiological dressing of thin split skin will take, and obviate the need of the last operation. Furthermore, if the last operation should have a poor take, the derma will epithelialize itself from the remnant of epithelium in the skin adnexae.

The author claims that dermis without its epithelial covering, when applied in a reversed position, takes as a free graft more readily than does a split skin graft of the same thickness. Theoretically, this is due to the fact that the deep surface of a Wolfe graft reveals numerous pits, each containing either a hair follicle or portion of a sweat gland, surrounded by a plug of fat. This eliminates 40 per cent of the graft from contact with the recipient bed when applied in routine fashion. Reversing the dermal graft exposes the entire fat-free dermal surface to the vascularizing influence of the host, which permits survival of the derma and the small islands of fat in the pits, and this in turn can nourish the second thick split-skin graft.

FIG. 1 (Hynes). Adherent ulcerated leg scar treated by a dermis-skin graft. a, Before treatment. b, Excised defect covered with healthy granulations. c, Result 2 years after treatment. d, Result showing mobility of skin-dermis graft.

The author has used this method in 21 cases during a period of 2 years. No epithelial cysts have appeared, and the method provides a skin cover which is not adherent and can be moved over the bone. Fig. 1 illustrates this strikingly.

Three cases are presented in detail with photographs. The procedure is not recommended for those cases in which so much tissue must be removed that the limb will be seriously weakened.

—*Carl Schiller, M.D.*

PHYSICOCHEMICAL METHODS IN SURGERY

ROENTGENOLOGY

Some Observations Concerned with Carcinoma of the Breast. MARLYN W. MILLER and EUGENE P. PENDERGRASS. *Am. J. Roentg.*, 1954, 72: 263, 462.

A SERIES of 1,034 patients with primary carcinoma of the breast was treated during the period between 1923 and 1943. Of the 1,029 cases that could be classified, 362 patients were treated by surgery alone, 557 by surgery and irradiation, and 110 by irradiation alone.

These primary breast carcinomas were all classified by the surgical member of the team, into Portmann's Four-Group Clinical Classification, Richards' Five Stages of Disease Classification, and Richards' Clinical Index of Malignancy.

The survival rates in this series were compared with those of Portmann and of Richards, and show no improvement when irradiation is employed in addition to surgery. In this manner, the results differ from both Portmann's and Richards' series.

In this series of 557 patients treated with surgery plus irradiation, 24 patients had preoperative irradiation but no postoperative irradiation; 34 had both preoperative and postoperative irradiation; 303 had postoperative irradiation; and 29 had postoperative irradiation to parts other than the operative field. The 5 year survival rates for the above groups are: 20.8 per cent; 29.4 per cent; 34.9 per cent; 41.3 per cent.

Statistically the 5 year survival rate was not increased by the use of preoperative or any form of postoperative irradiation over that obtained by surgery alone. This may be explained by virtue of the fact that only a small number of patients received a tumor dose of 3,000 roentgens or more, and this was given over a prolonged period of time.

Abstractors note: Most radiation therapists feel that a minimum tumor dose of 5,000 roentgens must be given in about 6 weeks to be effective.

—*John J. Gaughan, M.D.*

Angiocardiography by the Subclavicular Route (L'angiocardiographie par voie sous-claviculaire). R. AUBANIAC, P. VIALLET, L. SENDRA, P. COMBE, and L. CHEVROT. *Presse méd.*, 1954, 62: 1308.

THE AUTHORS have experimented with the subclavicular route for angiocardiography (discovered by Aubaniac) since 1952. This route affords sure access to the large brachiocephalic venous trunk which is absolutely fixed and patent, and is easily punctured by the technique described. It is indicated for all intravenous infusions if use of the usual veins is impracticable, as in children or in severe shock. It had been admitted that this route is useful in angiocardiography of the young or obese patient, but as the first studies were performed it appeared to be the route of choice in the adult as well as in the child.

The peripheral route, with or without exposure of the vein, is not practicable in all subjects and introduces a "dead space" before the dextrogram is obtained. The paracardiac procedures, although yielding good results, require a minor intervention in the introduction of the catheter. Direct cardiac procedures may be dangerous and frequently are incomplete. The subclavicular route requires only a transcutaneous puncture and can be performed at any age. It allows the use of a very large needle, which results in an excellent radiopaque bolus. The roentgenologic results are very good, comparable to those of the catheterization procedures, and sometimes superior to the latter. The only disadvantage is the possibility of paramediastinal injection, a benign mishap which can be avoided by adequate fixation of the needle prior to the injection.

The patient is placed on the seriograph and the physician stands on his right side. The needle is placed on a syringe and threaded into a special stop. The left index finger locates the first costochondral junction and then moves slightly laterally, keeping contact with this landmark and with the clavicle at all times. Puncture at this site is then made either in the horizontal plane or slightly superior, mesial, and posterior to it (40 degrees with the frontal plane). The needle is advanced until free reflux of blood is obtained, the stop is secured to the skin, the syringe is removed, and the injection apparatus is connected.—

—*Jonas Brachfeld, M.D.*

Gastric Volvulus. CHARLES GOTTLIEB, DAVID LEFFERTS, and SAMUEL L. BERANBAUM. *Am. J. Roentg.*, 1954, 72: 609.

ALTHOUGH previously rare, gastric volvulus was described as early as 1866. Opinion varies as to its etiology, and a variety of types of volvulus occur. The topographical classification by von Haberer is recommended as the most satisfactory to date. It lists the types of volvulus according to the types of rotation, and further classifies them according to extent, direction of rotation, etiology, and severity of symptoms.

Volvulus may occur secondarily to an intrinsic lesion of the stomach or to an extrinsic lesion of the neighboring organs. At times no cause can be demonstrated. Of the extrinsic causes, an abnormally long gastrohepatic or gastrocolic omentum seems most important. —*Lois Cowan Collins, M.D.*

Gastric Volvulus; Idiopathic Gastric Volvulus. DAVID LEFFERTS, SAMUEL L. BERANBAUM, and CHARLES GOTTLIEB. *Am. J. Roentg.*, 1954, 72: 616.

GASTRIC VOLVULUS may be present without symptoms, or it may produce intermittent mild or acute upper abdominal distress, depending on the degree of rotation. Volvulus up to 180 degrees may be present without obstruction or strangulation of the blood supply and may undergo spontaneous resolution. When the rotation is beyond 180 degrees the patients present signs of complete obstruction and the possibility of continuing strangulation.

Nine cases are presented, 6 organoaxial and 3 mesenteroaxial. The first group were all supracolic and the latter group were infracolic.

—*Lois Cowan Collins, M.D.*

Gastric Volvulus; Secondary Gastric Volvulus. SAMUEL L. BERANBAUM, CHARLES GOTTLIEB, and DAVID LEFFERTS. *Am. J. Roentg.*, 1954, 72: 625.

TWELVE CASES of the secondary type of gastric volvulus are presented. Organoaxial volvulus and cascade stomach may be difficult to differentiate, but the following features are useful in making the differentiation. The cascade stomach shows one fluid level, the volvulus two. The greater curvature is not uppermost in cascade action, but it is in volvulus. In volvulus, the uppermost rotated greater curvature forms a convex curve continuous with the duodenum, simulating an apparently enlarged sweep of duodenum. In cascade stomach the esophageal orifice is in normal position; in volvulus the orifice is in an unusually low position.

In all cases of acute conditions in the abdomen, volvulus should be considered.

The etiologic relationship of the colon should always be considered. The transverse colon is high in the epigastrium and in close relation to the stomach. Two cases showed the presence of hepatodiaphragmatic interposition of the colon.

—*Lois Cowan Collins, M.D.*

The Radiologic Diagnosis of Lower Urinary Obstruction in the Early Years. D. INNES WILLIAMS. *Brit. J. Radiol.*, 1954, 27: 473.

THE PRESENT article is concerned with obstructions involving the lower urinary tract which cause retention of urine and dilatation of the ureters because it is in these groups that infants and children present certain problems and suffer some rather unfamiliar diseases. The obstructions, for which radiologic assistance is required, are chronic lesions. The intravenous pyelogram is the first investigation undertaken in any case of urinary obstruction. Films are taken of the bladder before, during, and after micturition. Urethrograms, to be of value, must show opaque fluid being propelled downwards from the bladder, a propulsion which may be accomplished by active micturition or by manual pressure upon the anesthetized bladder. The urethra may be anesthetized locally by the injection of xylocaine gel or under general anesthesia. Expression cystourethrograms may be obtained by pressure on a distended dye-filled bladder. Anterior urethral obstructions are not common in childhood. Diverticula occur occasionally.

In the posterior urethra of the male a relatively common abnormality is the formation of obstructing valvular folds of mucous membrane below the verumontanum. The valvular folds are an exaggeration of one of the ridges normally found in the posterior urethra. The posterior urethra is dilated and elongated down to the region of the perineal membrane. The verumontanum is usually somewhat enlarged, and the ridges running down from it can be observed. The bladder neck usually shows as a strongly hypertrophied ring of muscle. In the plates, the urethral dilatation and the bladder neck hypertrophy are the obvious findings. Occasionally there is a reflux of dye into the seminal vesicles or vasa. Variations upon the classical pattern of urethral valves are seen from time to time.

Congenital strictures may occur in the region of the membranous urethra which also cause dilatation of the prostatic portion. There is, however, a curious group of cases in which an obstruction seems to be present at the level of the perineal membrane, yet it is neither a mucosal nor fibrous stricture. In cases of agenesis of the abdominal muscles which usually occurs in boys, a similar urethrogram may be seen.

Acquired strictures of the membranous urethra are fairly common; they result from fractures of the pubes. In these cases the urethra may be cut across and as a result the apex of the prostate is displaced upwards and forwards. The urethral channel is re-established but a stricture forms. Dilatation and elongation of the prostatic urethra occur above the stricture. In the combination of chronic retention of urine with dilatation of the posterior urethra, neurogenic bladder must always be considered. A urethral anomaly which is sometimes associated with obstruction is the rectourethral fistula with imperforate anus. The prostate can occasionally be a source of trouble even in infants.

In the female, urethral obstructions are not common. In both sexes, the bladder neck is an important site of obstruction, due to a hypertrophied bar of muscle thickening the internal sphincter. The deformity produced by this condition is only seen in true lateral films, and consists in a forward projection of the posterior lip of the bladder neck. Tumors of the bladder may give rise to obstruction to the outflow of urine. Congenital mucosal curtains arising from the trigone or anterior bladder wall have been described by some authors. The ureterocele-like dilatation at the termination of an ectopic ureter which opens a little below the bladder neck deserves some mention. The changes in the bladder and upper urinary tract which result from lower urinary obstruction are familiar. The bladder muscles are of course hypertrophied. Trabeculation is not always present and is not a definite indication of this when present. Sacculation of the bladder occurs in advanced cases but is more marked in neurogenic bladders. Ureterovesical reflux is a common finding in chronically obstructed cases, but its significance is not always easy to assess. Edema complicating cystitis and local abnormalities at the ureteric orifice may cause reflux and these have to be differentiated from infravesical obstruction.

—*Frank L. Hussey, M.D.*

MISCELLANEOUS

CLINICAL ENTITIES—GENERAL PHYSIOLOGICAL CONDITIONS

Brain Cooling in the Prevention of Brain Damage During Periods of Circulatory Occlusion in Dogs. W. M. PARKINS, JAY M. JENSEN, and H. M. VARS. *Ann. Surg.*, 1954, 140: 284.

THE RANGE and scope of many surgical procedures might be extended if the general circulation could be completely interrupted for prolonged periods. This has been prevented largely by the unyielding demand of the central nervous system for oxygen. Bigelow and, independently, Boerema were among the first to demonstrate the possibilities resulting from the fact that tissue oxygen demand could be reduced by lowering the body temperature.

The present study was undertaken in the hope that the brain, heart, and body core could be cooled differentially. It seemed reasonable to assume that differential cooling might reveal the separate effects of cold upon these structures. It was hoped that by such a method the central nervous system might be protected against anoxial damage for significant periods of time, and yet that the myocardial irritability might not be significantly increased.

A cooling device was constructed so that arterial blood at normal temperature was passed through a polyvinyl coil immersed in ice, cooled, and pumped back into the carotid artery and through the brain by means of a constant perfusion pump. This was arranged so that approximately 100 ml. of blood could be delivered per minute. Adult, healthy, mongrel dogs were anesthetized, one carotid artery was exposed and ligated, and catheters placed above and below the ligatures so that the proximal catheter was directed toward the heart and the distal catheter was directed toward the brain. This entire effort was to avoid the development of cardiac depression which frequently results from reduced general cooling of the body associated with increased myocardial irritability and with cardiac arrhythmia.

Their studies would indicate that differential cooling of brain temperature of about 15 degrees C., with a rectal temperature of 32 degrees C. can be accomplished with comparative ease and safety. All animals with brain temperatures above 12 degrees C. have been free of neurological damage. All animals cooled to brain temperatures below 12 degrees C. have shown evidence of central nervous system defects.

Brain temperatures of 20 degrees C. and general body temperatures of 32 degrees C. seem to be adequate to protect the animal against 30 minutes of complete circulatory occlusion. The authors' impression is that the myocardial irritability is significantly less under these conditions than under conditions of generalized cooling to comparable brain temperatures. Actually, temperatures somewhat higher than these may be entirely satisfactory.

—*LeRoy J. Kleinsasser, M.D.*

The Surgery of Conjoined Twins. IAN AIRD, W. J. HAMILTON, J. P. S. WIJTHOFF, and JOSEPHINE M. LORD. *Proc. R. Soc. M.*, Lond., 1954, 47: 681.

THE PRESENT ARTICLE is divided into four sections.

The first section includes a group of photographs taken from the motion picture film of IAN AIRD, showing details of the operation on the conjoined twins of Kano. The significant feature of the illustrations would appear to be exposure of the liver bridge between the twins with tourniquets in place and division of such liver bridge.

The second section (by W. J. HAMILTON) concerns the embryology of twinning. It is generally recognized that twins may be monozygotic (identical twins) or dizygotic (fraternal or unlike twins). In humans, twins occur once in about every 90 births and about one quarter of such twins are monozygotic. Only monozygotic twins are discussed in the present communication. In order that twins may be produced in a cleaving egg or blastoderm, certain conditions in each of two parts are essential: (a) there must be sufficient protoplasm present, and this must contain each of the different materials required in order that all the organs can eventually be produced; (b) in the protoplasm an organizing center must be present in order to integrate the developmental stages, regulate the arrangement of the materials, and compensate for loss. If the inner cell mass proceeds to develop in the usual manner, it gives rise to one embryo with its related yolk sac and amnion. If, however, the inner cell mass becomes divided more or less equally into two masses, two embryos are formed with related yolk sacs and amnions. If the separation is incomplete, conjoined twins are formed. If the separation is grossly unequal, or if one component is better placed so that it may obtain more of the placental blood, then the less favorably situated mass becomes a parasite on or within the other twin. There is a further possibility that two organizing centers may occur in a single formative area and give rise to twins. If the separation is incomplete, or if the organizing centers overlap in their spheres, then various forms of Siamese twins will be produced. Why the inner cell mass in mammals, including man, should occasionally separate into two masses is unknown.

The third section (by P. S. WIJTHOFF) concerns the conjoined twins of Friesland. It is stressed that prior to surgery it is of the greatest importance to elaborately investigate such twins to determine which of the many varieties of situations one may encounter in outwardly identical twins. The Friesland twins were girls with a combined birth weight of 6.5 kgm. and lengths of 50 and 49 cm. The height of the anastomoses was about 7 to 10 cm., the circumference about 25 cm., and the communication extended from the xiphoid bone to the umbilicus. The twins were 5 months old with a cartilaginous connection between the two sterna. There was no open communication between the stomachs or the small and large intestines.

The fourth section of the paper (by JOSEPHINE LORD) is concerned with the intra-abdominal "foetus

in foetu" and a report of 2 cases. The first case is that of a 7 weeks' old boy who presented with a smooth hard mass in the left abdomen and flank. This mass was sausage-shaped and extended from the left costal margin to the brim of the pelvis. What was at first thought to be a teratoma was surgically removed as an encapsulated tumor. There were three apparent limb buds bearing digits equipped with nails. X-ray films of the specimen revealed a vertebral column, ribs, and a pelvic girdle. There was a spinal canal, meninges, spinal cord, and loops of intestines suspended within an endothelial-lined cavity, adrenals, and testes. A second similar case is also described but in less detail. It seemed reasonable to believe that these two specimens were of "foetus in foetu" developing through the primitive streak stage of embryogenesis and were, in fact, included twins; that is, malformations and not neoplasms. A teratoma, however foetiform, is potentially malignant and radical removal must be accomplished. In cases of foetus in foetu, however, heroic surgery is not essential, and if necessary the encapsulating sac may safely be left in situ.

—Allan D. Callow, M.D.

Pancoast Syndrome (Della sindrome di Pancoast). A. FRANZ and G. GALLI. *Chir. org. movim.*, 1953, 39: 465.

FIVE CASES of Pancoast's syndrome, from the Orthopedic Clinic of the University of Padova, are reported. There were 2 primary pulmonary tumors, 1 supraclavicular malignant tumor, 1 pleural neoplasm, and 1 supraclavicular lymphatic neoplasm.

Four of the patients presented cervicobrachial symptoms and only 2 showed a Horner's syndrome. In all cases the pulmonary findings were objective.

The authors point out that the pulmonary apices should be investigated clinically and radiologically before resorting to surgical intervention in all patients with brachial plexus symptoms.

—Lucian J. Fronduti, M.D.

Studies on Staphylococci from Hospital Patients; Predominance of Strains of Group III Phage Patterns Which are Resistant to Multiple Antibiotics. VERNON KNIGHT and ANNA R. HOLZER. *J. Clin. Invest.*, 1954, 33: 1190.

A STUDY is presented of 516 strains of Staphylococcus aureus, principally cultured from the nose, throat, and rectum of staphylococcus carriers at Bellevue Hospital, New York, in 1953 and 1954. It was found that 65 per cent were resistant to the four antibiotics—chlortetracycline, oxytetracycline, streptomycin, and penicillin. More than 90 per cent of these drug-resistant strains were of phage group III patterns. The strains of staphylococci were of intermediate degrees of susceptibility to chloramphenicol and nearly all were highly susceptible to erythromycin.

In contrast, 55 similar strains collected in the period from 1932 to 1938 were, to a large extent, susceptible to penicillin and all were inhibited by low concentrations of the tetracyclines and erythromycin. They were of intermediate degrees of susceptibility to streptomycin and chloramphenicol and only 20 per cent were in phage group III.

Few staphylococci of group III phage patterns resistant to multiple antibiotics were isolated, on admission, from staphylococcal carriers at Bellevue Hospital, but thereafter, among such patients as were treated with tetracyclines, these "hospital staphylococci" rapidly replaced other strains of staphylococci. Cultures from patients treated with penicillin underwent a similar but significantly less rapid change, while only a moderate increase in the percentage of the strains of "hospital staphylococci" occurred among patients who received no antibiotics.

—Ernest D. Bloomenthal, M.D.

Hypothermia: Physiological Observations During Hypothermia. D. N. Ross. *Guy's Hosp. Rep.*, Lond., 1954, 103: 116.

IN A PREVIOUS ARTICLE this author presented a technique for extracorporeal cooling of the organism. In the present article the author discusses various changes that take place subsequent to cooling animals to 25 degrees C.

The clotting time was increased 12 to 15 minutes, which obviated the need for anticoagulants. At 25 degrees there was apparent suppression of the urine. If this be so, the body loses a very important organ for maintaining homeostasis. Blood stream cooling afforded a uniform decrease in body tissues—a normal gradient between different tissues was maintained.

At 25 degrees C., oxygen consumption is 39 per cent of normal. Shivering may cause an increase in oxygen consumption of 200–300 per cent. One of the advantages of blood stream cooling is that it reduces the incidence of shivering. The oxygen content of arterial and venous blood increases during cooling but a normal ratio is maintained. This suggests that tissue respiration takes place readily at these low temperatures. The increase in oxygen content of the blood is accounted for on the basis of greater physical solubility.

Cardiac output at 25 degrees C. is about 50% of normal. The output may be lowest early in the rewarming period, and may still be below normal an hour after normal rectal temperatures are attained. Some deaths in the rewarming period have been attributed to low cardiac out-put. Electro-cardiographic changes consist mostly of elevated ST segments, inverted T waves, and widening of the complexes. Cooling below 25 degrees C. may induce heart block and ventricular extrasystoles.

The hematocrit generally increases, although no decrease in blood volume can be demonstrated. This is the situation in the early cooling period; however, later at 25 degrees there is a fall of 3 to 6 per cent in the hematocrit. There is a concomittant increase in cell fragility, and cell volume. Splenectomy does not alter the response.

There is a tendency for the plasma potassium to fall. It is hazardous to apply deductions from animal experimentation in this realm to humans, because of the preponderance of sodium in the animal red-cell. Potassium chloride has been used to reduce the irritability of the myocardium. In cases of ventricular fibrillation this drug has decreased the fibrillary tremor, but does not establish rhythm.

Blood reaction during cooling tends toward the acid side. This could be the result of greater solubility of carbon dioxide in the plasma. Reverses in plasma

pH can be obtained with hyperventilation. Alkalotic animals tend to have a flabby heart whereas acidosis leads to cardiac irritability.

Changes in physiology incident to induction of hypothermia are not inconsistent with life, and many adverse reactions can be controlled. This extra corporeal, intravascular cooling has the advantage of a sharp end-point, a ready arteriovenous communication for coronary perfusion, and elimination of shivering phenomenon. Surface cooling may cause cutaneous gangrene, and furthermore this method for hypothermia requires deeper anesthesia.

The rapidity and depth of hypothermia should be controlled. Rapid cooling induces ventricular fibrillation. Twenty-five degrees C. has been found to be the optimum temperature with this method of cooling. Anesthesia is unnecessary below 27–28 degrees. The action of anesthetic drugs will be prolonged because of reduced metabolism. During rewarming shivering should be avoided. The mechanism of death occurring in this period is incompletely understood. The changes in blood reaction have been attributed to accumulation of carbon dioxide and acid metabolites. This situation tends to induce ventricular fibrillation. Fibrillation is best treated by electroshock followed by cardiac massage. —*Richard L. Lawton, M.D.*

Factors Influencing Nitrogen Metabolism in Surgical Patients. John M. Beal, George N. Cornell, and Helena Gilder. *Surgery*, 1954, 36: 468.

The authors report their preliminary observations on metabolic response to operation. Variations in the intake of potassium, nitrogen, and calories were correlated with the catabolic response to operation.

Patients in this study were divided into two groups: Group I required cholecystectomy for chronic gallbladder disease, and Group II required subtotal gastric resection for chronic duodenal ulcer.

All patients were placed in the metabolic ward. Weight, food, and water intake were measured, and all outputs were carefully collected. Patients undergoing cholecystectomy received an accurately measured diet for 4 days preoperatively. On the day of operation and for the first 2 days after surgery the intake was maintained by intravenous fluids consisting of 25 per cent glucose and 5 per cent alcohol, 5 per cent fortified protein hydrolysate, and potassium chloride. After the second postoperative day, oral intake was resumed. The patients undergoing subtotal gastric resection were fed in various manners, varying from a six-feeding gastric diet to only intravenous fluid for as long as 5 days postoperatively.

The results were as follows: the 4 patients who had cholecystectomy were well nourished and well developed females who had an ingested adequate low-fat diet prior to admission. One patient served as a control. Negative nitrogen balance occurred promptly on the day of operation in the control patient. This patient did not receive intravenous protein hydrolysates in the period following operation. The negative nitrogen balance persisted until the fifth day after operation. The other 3 patients received nitrogen as protein hydrolysate, beginning with the operative period, and in this group the negative nitrogen balance was delayed until the first or second day after operation. Measurements of potassium showed that there were no significant alterations of the serum potassium levels. There did not appear to be any correlation between potassium and nitrogen balance in these patients with the degree of trauma represented by cholecystectomy. The sodium balance did not appear to be remarkable in this group.

All patients in whom gastrectomy was required were males. The operative procedure was quite uniform, but the status of the patients varied rather widely. Nitrogen studies in the control patient showed onset of negative nitrogen balance on the day of operation and nitrogen equilibrium was restored on the sixth day when nitrogen intake was resumed with oral feeding. The most marked negative nitrogen balance occurred 2 days after operation. One patient who was markedly depleted was maintained by intravenous alimentation without oral intake for 22 days before operation. His response to operation was characterized by predominantly positive nitrogen balance with 3 days of negative balance interspersed throughout the immediate postoperative period. A third patient received an average of 13.8 gm. of nitrogen daily for 6 days, beginning the day of operation. Negative nitrogen balance became manifest the day following operation, and positive balance was attained on the sixth postoperative day. A fourth patient gave a picture of an excessive response to operation. Negative nitrogen balance occurred the day of operation and continued throughout the period of study although he received an average daily intake of 13.5 gm. of nitrogen. Measurements of potassium revealed that administration of as much as 2.1 mEq. of potassium per kgm. per day did not result in a positive balance in the immediate postoperative period in any of the patients.

The authors believe that the present study tends to support the contention that exogenous nitrogen can be utilized following injury. The magnitude of the operation or the severity of trauma greatly affects the chances of reversing the catabolic phase following trauma. Similarly, the severity of trauma also appeared to influence the potassium balance. It is believed that supplying nitrogen and calories during stress should effect a sparing action on the patient's lean tissue and that this observation is important when one is dealing with depleted patients who require immediate surgery, or in patients who are unable to take oral feedings for a long period of time following surgery.

The authors state that further study of a larger series will be required to determine the relation between the degree of stress and the preoperative nutritional state and the catabolic response.

—*Yoshio Sako, M.D.*

Value of Microscopic Examinations of Material Collected by Puncture or Aspiration for Biopsy on a Surgical Service (De la valeur des examens microscopiques pratiqués sur du matériel prélevé par ponction ou aspiration biopsie dans un service de chirurgie). Claude Bollack. *Rev. chir.*, Par., 1954, 73: 102.

The author, of the Surgical Department of the University of Strasbourg, France, discusses the diagnostic value of cytologic examinations and describes in

detail the technique of collecting and processing the material for cytodiagnosis. Finally, the characteristics of malignant cells are discussed briefly and illustrated by photomicrographs.

The collection of material from the bronchial tree by washing or aspiration under control of the bronchoscope is relatively simple and satisfactory; however, the collection of useful material in suspected gastric carcinoma is more difficult. The stomach should be free of all food, the patient must have fasted for 12 hours, and repeated gastric lavage is sometimes necessary before material can be obtained by aspiration under direct control of the eye. The specimens must be fixed immediately, otherwise the alteration of the cells produced by the acidity of the gastric juice make a correct evaluation impossible. In suspected kidney tumors the material is collected by ureteral catheterism. In bladder tumors the growth is visualized by the cystoscope and the material is aspirated from the periphery of the tumor. For examination of the prostate, direct transperineal puncture of the prostate, after preparatory treatment with streptomycin, is necessary.

The author reports and tabulates the results obtained in 61 cases of suspected bronchial carcinoma, 23 cases of stomach secretions, 19 cases of bladder tumors, 27 cases of suspected prostatic tumors, 6 cases of kidney tumors, 5 examinations of pleural or peritoneal exudate, 3 biopsies of bone tumors, and 6 cases of suspected malignant lesions in the pharynx and larynx.

Tabulation of the cytologic results as compared with the clinical course and the final diagnosis demonstrates the limitations of the cytologic method. The proportion of false positive as well as false-negative cytologic diagnoses seems too high to give this diagnostic method a decisive value. To give one example: of the 61 specimens of bronchial secretions, the diagnosis of carcinoma was made in 27 cases; in 6 of these, the subsequent clinical course proved the diagnoses to be wrong. One case was lost to follow-up. On the other hand, in 21 cases the cytodiagnosis was negative but in 4 of these the lesions proved finally to be carcinomas. In the remaining 13 cases the diagnosis was "doubtful", and in 6 of these the lesions were finally recognized as malignancies. About the same proportion of false-positive and false-negative diagnoses applied for the specimens collected from other organs. —*Werner M. Solmitz, M.D.*

The Dormant Cancer Cell. GEOFFREY HADFIELD. *Brit. M. J.*, 1954, 2: 607.

THE TIME elapsing between the excision of a human malignant tumor and the reappearance of a clinically recognizable recurrence varies from a few months to 30 years. When the interval is short, it is probable that the secondary tumors are the product of continuous proliferation of the cells of microscopic fragments of the growth. Some of these may be portions of the primary growth which have escaped excision. Others may have already reached a distant organ by lymphatic, venous, or arterial embolization, before the tumor was removed.

When the interval is prolonged to 6 years or more, the cells of the dormant growth are undoubtedly in a state of mitotic temporary arrest. These dormant cancer cells lose none of their former capacity to grow rapidly and infiltrate widely.

The dormant cancer cells may exist in or near the operative site for long periods of time, in poorly vascularized connective tissue; this environment possibly subjects them to continued relative anoxia. The dormant cell may lie in regional lymph nodes, where also they may fail to multiply in a fibrous and anoxic environment. It may be reasonable to assume that mitotic arrest may have been induced by anoxia or some metabolic deficiency, and that mitosis would be re-established if adequate oxygen became available by vascularization of the scar. The induction of the dormant state in microscopic foci of metastatic tumor, and their reactivation, in deeply placed organs is difficult to understand. Such foci must have been implanted before excision of the primary growth. The anatomic site of these minute quiescent growths must be significant, for, in at least 50 per cent of cases of malignant disease recurring after latent periods of from 5 to 30 years, reactivated metastatic growth of macroscopic size was found in the hemopoietic bone marrow. The phenomenon of mitotic arrest for long periods is rare in the kidney, lung, brain, and skeletal muscle; it is not infrequently present in the adrenal cortex.

At present, there is no reliable information regarding the environmental factors which induce mitotic arrest of tumor cells in human tissues. If tumor cells which have been maintained at minus 70 degrees for many months are rapidly thawed and examined, cells with clearly defined nuclei may be seen, which show little obvious abnormality. These cells, however, are dead and incapable of transmitting the tumor on grafting. In addition to these, a number of smaller and highly refractile spherical bodies are seen, in which no nuclei are visible, and whose plasma membrane is very refractile and appears to be thickened. These small refractile cells have been described as "paramorphic." They alone have the capacity to resist and survive anoxia, dehydration, and metabolic arrest. The tumor-inducing activity of a thawed out malignant tumor, after a period of anoxia, is directly related to the number of paramorphic cells present in it.

The experimental conditions which govern the induction of the paramorphic state in cells need confirmation; yet certain generalizations can be made:

When defended against the harmful physical effects of cold, the cells of some malignant tumors have a remarkable capacity to survive anoxia and metabolic arrest due to exposure to low temperatures in vitro. After long periods in the frozen state, certain cells in these tumors retain their full productive vigor and malignant potentialities. The capacity of a frozen tumor to survive appears to be strictly limited to its undifferentiated cells. Tumor cells capable of surviving rapidly undergo a series of characteristic morphologic changes when subjected to low temperatures.

The fact that malignant cells can survive long periods of experimental metabolic arrest offers an explanation of their in vivo ability to withstand separation from their parent growth, until a capillary circulation is provided for them. This may apply to the microscopic focus of isolated cells which form the

nucleus of a metastasis or to groups of cells which become completely detached from the parent growth during the process of malignant infiltration.

—*Samuel Kahn, M.D.*

The Treatment of Metastatic Carcinoma. HENRY M. LEMON. *Med. Clin. N. America*, 1954, 38: 1281.

HEREIN is presented evidence for a degree of enthusiasm in the treatment of metastatic carcinoma. The author insists that an accurate diagnosis be made, as the type of therapy may be greatly influenced by cell type. He advocates palliative surgery to allay the complications of tumor growth on normal organ systems.

A chart is presented of 9 patients with neoplastic disease in whom spontaneous regression has been verified. In females with hydrothorax or ascites, it is important to know whether peritoneal involvement is the result of neoplastic spread from a gastrointestinal neoplasm or from ovarian tumor. In the latter a degree of regression may follow resection of the ovaries, and the tumor is somewhat tractable to radiation therapy, contrasted to gastrointestinal neoplasm. Solitary nodules in the lung fields should be resected, especially those appearing several years after control of the primary lesion. The presence of second primary tumors should not be overlooked. "Second look" operations appear justified.

The indications for the use of radiation therapy are many. The accessible lesions are particularly suitable. Nerve root pain, with or without demonstrable osseous involvement, is an indication for radiation therapy. Dosage can exceed 20,000 roentgens if administered carefully over small portals. Hormone therapy in conjunction with radiation therapy can prevent pathologic fracture. Care must be used when radiating areas over cartilage, teeth, or lungs. Lymphomas are very radiosensitive; melanomas are resistant.

Chemotherapy of tumors offers mostly palliation of brief duration. Nitrogen mustard is most frequently used, sometimes with other therapy. Regional intra-arterial mustard is of value in selected cases.

Radioactive isotopes of gold are used in mesothelial-lined cavities to suppress neoplastic growth. This type of radiation is in the form of beta-rays; their radiant activity is limited to several millimeters. After administration of the drug into pleura, peritoneum, or pericardium the patient should be placed in different positions to distribute the dosage in the cavity.

Endocrine therapy is frequently very gratifying. Breast, thyroid, ovary, prostate, and endometrium are the sources of neoplasm most likely to gain benefit from hormone treatment. Oophorectomy is beneficial in breast carcinoma, as is orchectomy in prostatic cancer. Adrenalectomy is useful in hormone-dependent tumors, because sex hormones can be elaborated by this organ. It is estimated that 10 per cent of adrenal hormones administered following adrenalectomy are converted to androgens. Adrenalectomy is more efficacious in the control of mammary cancer rather than prostatic cancer. Atrophy of the adrenal cortex may be induced with replacement therapy and subsequent withdrawal. Ablation of the hypophysis has some advocates.

The laboratory procedures that are most useful in assessing the degree of metastatic involvement and the efficacy of treatment are: (1) acid phosphatase, (2) alkaline phosphatase, and (3) urinary gonadotropins. A case of metastatic mammary carcinoma is presented with a 4 year survival to date. Radiation therapy was the primary agent; it was used on the breast, nodes, and bony spread. Hormone therapy supplemented radiation. The timing of therapy may be of great importance.

Pain may be controlled by surgery and drugs. Chordotomies are useful for lesions below the nipples. Rhizotomy and prefrontal leucotomy may be indicated in specific instances. There is a wide choice of drugs. Several drugs with low tolerance are available, one of which is methadon. This drug has a longer-lasting effect than morphine. The latter drug is of value in the terminal phases of disease. Cortisone will induce a salutary change of mood and will increase the appetite.

—*Richard L. Lawton, M.D.*

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